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ENVIRONMENT

VISION AND PRESCRIPTION

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This paper outlines a vision for DLA's IRM environment in the mid-1990s and beyond. It prescribes a re-engineered data, process, technology, and organizational environment intended to facilitate sharing of data, manufacturing of I/S components and the assembly of applications to a customer's order. Its tenets are achieved through a single image corporate data model of subject data bases, business process foundation modules, design to the "State-of-the-Contract" technology policy, extensive use of information engineering and repository methodology, central development and maintenance of application components, distributed application assembly, open systems, and cooperative processing. It recognizes the need to make several paradigm shifts and prescribes alternative migration strategies including fresh start and cross model resolution evolutionary approaches.

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FOREWORD

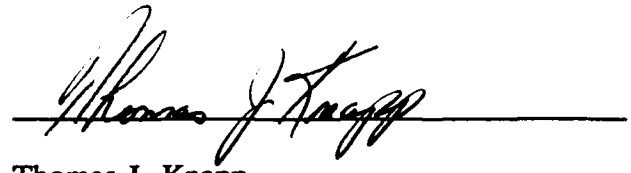
TO ALL DLA INFORMATION SYSTEMS PERSONNEL:

This paper portrays the Office of Information Systems and Technology's (DLA-Z) future IRM Environment Vision. As such it institutes primary IRM directional objectives and acts as a seed for all IRM planning and subsequent implementations. I request that all DLA IRM components be guided by its tenets. I have already requested work to begin on the development of real-world and target-world data models, the attainment of an Agency-standard integrated CASE environment, the inclusion of DLA-Z's IRM business area data entities into modeling efforts, the attainment of Cross Model Resolution (XMR) facilities, the identification and development of common business process modules, the acquisitions to complete the technology array for our design to the "State of the Contract" policy, and the update of our open systems architecture policies.

This version of the paper replaces the Strawman[a]. It incorporates comments received from DLA organizational components and has been coordinated with the DLA Principal Staff Elements.

Although this paper expresses the position of DLA-Z it is subject to continuing review as appropriate. Please submit recommendations for revisions to me personally or to Bob Knez, DLA-Z (703-617-7107). Revisions that were made since the previous version are bracketed by vertical lines (|). Double vertical lines (||) indicate the deletion of text.

I appreciate the contributions of all of you towards the continuing achievements of DLA information systems. The success of DLA information systems is probably the largest factor affecting the overall attainment of DLA's missions. The efforts involved in realizing the "IRM Environment Vision" are substantial, but we must move ahead to insure that DLA benefits from the highest business values achievable from its information systems.



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1. INTRODUCTION

This paper presents a concept and vision of the DLA Information Resources Management (IRM) environment for the period subsequent to the consolidation of Information Processing Centers (IPCs) currently being planned by DLA and by DoD. This places the time-frame for the implementation of this paper's concepts into the mid-1990s and beyond. The concept/vision will be structured to facilitate the consummation of DLA's Conceptual Functional Requirements (CFR)[b] and Strategic Plans[c], and will set goals to help focus the human resources of DLA's IRM environment toward that end.

It is understood, at the outset, that the Information Systems (I/S) community, as a whole, and DoD in particular, is undergoing enormous change from both technical and cultural perspectives. These changes are being invoked by numerous paradigm shifts in the I/S industry as well as by the demands of a leaner DoD budget. Although DLA will attempt to influence external events, to the extent it can, to assure optimum return on its I/S investment, DLA can only plan those events that it has authority to cause or can reasonably forecast, such as a continuation of the trend towards increased cost/performance of information technology (I/T). Thus, this paper does not plan for or make specific guesses as to which DoD Consolidation alternative will become a reality. Instead, this paper will prescribe an environment and strategies for achieving it that are designed to optimize IRM cost/effectiveness while remaining generic enough to fit whichever consolidation scenario is played, and to be consistent with other major programs such as CALS[1], MODELS[2], and Electronic Commerce (EC)/EDI[3].

The number of sites to be deployed, although portrayed in this paper for visual completeness, is not a critical factor. What is significant to define are; the requirements for effective management of the IRM environment, the concept and responsibilities of Information

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[1]CALS - Computer-aided Acquisition and Logistics Support.

[2]MODELS - Modernization of Defense Logistics Standard Systems.

[3]EDI - Electronic Data Interchange.

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Technology Facilities (ITFs), a concept for migration to the envisioned environment, and the enabling tools needed to succeed in making paradigm shifts in information system application and data base engineering.

Neither DLA's consolidation plan nor the Defense Management Report Consolidation Study[d],[e] include ¦fundamental re-engineering¦ of the current automated information systems (AISs) or the development of corporately structured data models. The inclusion of AIS and data base restructuring during this initial consolidation would almost certainly prove to be more than DLA or DoD could effectively undertake and is best left to a later phase after the impact of the consolidation has been absorbed and the new environments are in normal operation.

This paper deals with the next phase - **Re-engineering the IRM environment**. Re-engineering provides the first genuine opportunity for the implementation of truly open systems architectures[4]. The re-engineering phase will stress the implementation of the seemingly lofty ideals of corporate data bases and applications which are assembled from common application modules. It will also stress the critical need for comprehensive strategies for the migration of data and processes to the newly engineered models.

¦Several readers of the Strawman version requested a capsule summary of the Vision. Hopefully the next page will serve this need. For a quick overview of the paper its suggested that you read through the **VISION TENETS** on the next page; then read Section 6. **EXECUTIVE SUMMARY**. If you still need more, resume reading the paper at Section 2. **PRESCRIBED IRM ENVIRONMENT.**¦

[4]Many older information systems were developed for and are dependent upon vendor proprietary technical environments such as non-POSIX compliant operating systems, non-SQL Data Base Management Systems, telecommunications monitors, and even assembly languages. Complicating the issue; a variety of vendor dependent operational support systems for scheduling, capacity management, and direct access storage space management may be utilized.

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VISION TENETS

DATA SHARING THROUGH A SINGLE IMAGE CORPORATE DATA BASE

IRM DATA ENTITIES INCLUDED IN CORPORATE DATA MODEL

APPLICATION DEVELOPMENT THROUGH ASSEMBLY OF STANDARD COMPONENTS (LEGO BLOCKS)

DATA - SUBJECT DATA BASES

PROCESS - BUSINESS PROCESS FOUNDATION MODULES

TECHNOLOGY - HARDWARE AND SOFTWARE

COMPUTER ASSISTED SYSTEMS (SOFTWARE) ENGINEERING ENVIRONMENT

CORPORATE INFORMATION ENGINEERING REPOSITORY

BUSINESS FUNCTIONS

BUSINESS PROCESSES

BUSINESS DATA ENTITIES

BUSINESS PROCEDURES

ORGANIZATION

CENTRAL DEVELOPMENT, MAINTENANCE AND MANAGEMENT OF LEGO BLOCKS

APPLICATION DEVELOPMENT CENTRALLY MANAGED BUT EXECUTED IN A DISTRIBUTED MANNER WITH AN END OBJECTIVE OF TURNING THE MANAGEMENT OF ALL APPLICATION DEVELOPMENT OVER TO PRINCIPLE STAFF ELEMENTS

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2. PRESCRIBED IRM ENVIRONMENT

|Many| of DLA's automated information systems are decades old and have been developed and modified through years of changing technology and design ideals|[5]|. While these systems continue to provide support to DLA's Principle Staff Elements (PSEs) and its User communities, they do not |always| facilitate effectiveness at a level achievable with today's technologies and IRM paradigms. While it may be prudent and cost/effective to complete today's consolidations by simply combining the current IRM environments, we must set our subsequent goals on the optimization of the consolidated environments through re-engineering the environment in-line with the potentials accorded by modern technology and methods. Only then will full cost/effectiveness be achievable. The above considerations apply as well to the entire DoD community, since even after DoD consolidations and "Interim Standard Systems[6]" integrations of applications are completed, DoD will still be left with systems that need re-engineering. As Yogi Berra so aptly put it; "The future ain't what it used to be".

John A. Zachman's Information Architecture Framework (see enclosure 5) describes a manufacturing paradigm for the building of information systems. His manufacturing paradigm applies to all three parts (Data, Process, and Network) of an information system architecture[7]. His data architecture description supports corporate data structures and the inevitable separation of process and data. At the designer's level it supports the development of entity-relationship models. His process architecture supports the use of data flow diagrams at the designer level. His network architecture models the deployment of technology which is described as nodes and lines (links). The underlying theme of Zachman's architecture is that I/S must mature, as other sciences have, and begin to look at itself as a manufacturing activity rather than a job shop. At the Guide User's conference in

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[5]Several recently developed DLA applications such as AIMS (Automated Inventory Manager Support), DPACS (DLA Pre-Award Contracting System), and TRIPS (Travel Reporting Integrated Payments System) have implemented new paradigms such as Client/Server.

[6]Previously referred to as "Best of Breed".

[7]Zachman is extending his framework to include the more abstract concepts of "Role", "Timing", and "Motivation".

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November 1990, Jim Archer of IBM described the software factory of the future as: "Model driven, Automated, Re-use, and Re-engineering". We can equate these characteristics to:

IBM's WORDS	THEIR MEANING IN DLA
"Model driven"	= Entity/Relation and Process models
"Automated"	= CASE tools
"Re-use"	= Business Process Foundation Modules, Standard Technology Contracts, and Subject Data Bases. (DLA's Lego Blocks)
"Re-engineering"	= Not just cut-and-paste

Put simply - this concept means that we must manufacture[8] the parts (data bases, process modules and network nodes/links) and assemble them to order (see enclosure 9). In other words a PSE's functional requirement may be considered as the "order" that initiates the assembly of an I/S application using standard parts out of inventory and automated CASE tools to manage the assembly.

The following list reflects prominent features and characteristics of the prescribed re-engineered IRM environment which differ from the current environment and are critical to full cost/effectiveness. The list is divided into three parts; Data, Process, and Network to correspond with the information systems architecture framework prescribed by John Zachman[f]. Fourth and fifth items on the list are Technology and Organization to round out the overall prescribed environment.

a. DATA ARCHITECTURE ENVIRONMENT

DATA SHARING

DLA's strategic objectives as well as its conceptual functional requirements state that its future systems will share data across applications through the

[8]The term "manufacture" is used loosely. It simply means that the components will be acquired by whatever means are necessary; build it, buy it, etc.

development of common subject data bases. Subject data bases aggregate data according to data subjects instead of application usages. Thus, there is not a one-to-one correspondence between each data base and a specific application because a data base may be utilized by many applications and an application may use many data bases. This represents a fundamental paradigm shift in the view of data which is difficult for many corporations to accept and to subsequently achieve. The aggregate of subject data bases form |a single image DLA| Corporate Data Base. The Corporate Data Base will be physically deployed by placing appropriate subject data bases at the sites with the highest frequency of reference|[9]|. The replication[10] or segmentation[11] of subject data bases will be determined by the degree of redundancy necessary for security or processing efficiency. In any case, replication or segmentation of data must be a design decision which is accompanied by appropriate facilities and procedures, |such as recovery and audit trail|, for maintaining the synchronization and integrity of the data.

As DLA performs the information engineering work for the re-engineered subject data environment it will also seek opportunities to reduce its own requirements for storage and processing of data within DLA in those cases where it is more economical and effective to rely upon the data originator. The potential for overall systems integration of hybrid data is most evident in the logistics data management area[8] but is likely to occur on a much wider scope due to increased electronic commerce.

IRM DATA IN CORPORATE DATA STRUCTURES

DLA has a number of mission areas |such as Material Management, Distribution Services, and Acquisition Services|. DLA's IRM organization

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[9]Other factors such as physical space considerations, availability of maintenance, and data administration must also be considered but the prime target is locality of reference.

[10]Replication - A redundant copy of the data set.

[11]Segmentation - A non-redundant distribution of portions of the data set; e.g. The current SAMMS data is segmented by stock class to the controlling Supply Centers.

has developed many automated information systems such as, SAMMS, DWASP, |DLIS|, DROLS, and MOCAS to support DLA's primary mission functions. Other DLA |Corporate| Support functions such as personnel management and pay administration have also been supported by standard AISs such as APCAPS. Although these applications have been developed under the old paradigm of application-data-bases, the data bases at least provide a common point of reference across their mission management function. Not unlike most other large IRM organizations, DLA IRM has not provided as well for its own management functions. Numerous applications and data bases exist in headquarters, design, and operational organizations throughout the Agency for the purpose of information resources management. With the exception of systems such as ARMS (Automation Resources Management System) there are no standard AISs for IRM.

DLA's future re-engineered IRM environment will include the data necessary for the effective functioning of the IRM organization as well as that of DLA's primary mission function and other support areas. Data modelling for the entities of interest to the IRM organization[12] is as important as the data modeling for the rest of DLA's data and will become a part of the corporate model. This means that applications that are developed for IRM organizations (IRM Budget Management, Capacity Management, Configuration Management, Project Management, Document Flow Management, Acquisition Management, etc.) will be integrated through the common data structure. All IRM personnel throughout the Agency will use this data base as part of their normal routine. The adage may become - If it isn't on-line it doesn't exist.

The creation and routine use of the data base for all IRM functional and executive information retrieval activities will assure consistency and integrity of data for decision making, drastically reduce or eliminate data calls that are habitually and repeatably made by study teams within DLA and DoD, increase the sense of teamwork among IRM organizational components, and increase the overall speed of service and effectiveness of managing the overall IRM

[12]Enclosure 6 to this paper contains a list of potential data entities necessary for supporting the many business sub-functions of the IRM organization.

environment. All of these benefits will produce the desired effect of improving the quality |and accuracy of data|, and reducing the cost of the services provided by the IRM organization to its customers.

b. PROCESS ARCHITECTURE ENVIRONMENT

COMMON APPLICATIONS ARCHITECTURES

In the past, DLA and the other services have often developed application systems from separate and unique technology and functional components. A case in point lays in DLA's own Material Management functional area. Over the years DLA has developed three separate systems for inventory control; SAMMS[13], DFAMS[14], and DISMS[15]. These systems do not share common business process foundation modules, data base models or structures, or technology platforms. It is a conceded point that these systems are designed to manage radically different commodities with totally different considerations in regard to storage, shipping, shelf life, acquisition methods, etc. therefore the systems should be unique. While this is true, there are bound to be a number of low-level process commonalities which could be shared. Certainly there is the potential for the utilization of a common technology platform and common structuring methods such as described in Laurence J. Best's Application Architecture for Modern, Large Scale Information processing[h],[16]. |Little, if any, excuse still exists for the building of totally unique systems.|

The Services and DLA have long been pressured to share each others information systems, that on the surface, appear to perform the same mission

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[13]SAMMS - Standard Automated Material Management System.

[14]DFAMS - Defense Fuels Automated Management System.

[15]DISMS - Defense Integrated Subsistence Management System.

[16]Laurence J. Best works for AMS (American Management Systems) who has been studying and applying the concepts of common business foundation modules for a number of years.

functions. Service resistance to the sharing of these systems has always been strong. The Services and DLA complained that only their systems matched the way they did business, therefore the use of common systems would be impossible. Forced by economic necessity, the CIM program is addressing this challenge head on, and will eventually succeed in forcing common environments. Unless the selected systems are modified to meet all the Service and DLA's needs, the recipient of a foreign system will have to adjust its business procedures. This can be done but will be difficult because it affects cultures which are driven by their own inertia. ¦Enclosure 11 should be reviewed for considerations that must be made in the implementation of Interim Standard Systems¦.

Discussions of re-usable code, codeless programming, business foundation modules, shrink wrapped software, and technology independent application designs are not new. The time has arrived however, to take these objectives seriously and to develop business process modules that may be utilized much like Lego blocks to build virtually any application structure desired. The objective is to manufacture the parts (modules) that may later be assembled into products (applications) tailored to the customers order. Most likely this will require the addition of outer blocks (shells) of uniqueness to meet the cultural needs of the users, but the applications will be built largely of off-the-shelf components. Much work still needs to be done in determining ways within information engineering methodologies to identify candidates for common modules such as is now done in determining subject data bases by affinity analysis. This work must begin now.

Emerging technologies such as "object oriented" show promise in improving the degree to which program code may be re-used. Objects inherently know what to do when encountered by other objects; e.g. a Customer Account object knows to subtract from its balance when it encounters a Withdrawal object. This is because the customer object carries the balance data attribute while the withdrawal object carries the amount withdrawn attribute and they each carry their own process attributes. This is quite a different concept for programmers familiar with older techniques to swallow but, because of this encapsulation, should make the objects very self sustaining and portable. This concept is

much more difficult than relational, although any work done in relational will help in changing to an objected oriented paradigm when desired.

c. NETWORK ARCHITECTURE ENVIRONMENT

NETWORK COMPUTING

During the next five years I/S industry computer systems will increasingly take on the form of network computing. Increased communications protocol standardization, expanded bridge,|router| and inter-net gateway capabilities, and increased implementations of client/server with cooperative processing systems, both at the wide and local areas, will finally integrate computers and telecommunications. Overall systems will be viewed as computing networks with data storage, processor, and gateway nodes. Networks of networks will be the norm.

|Although recently developed applications such as AIMS and DPACS have been implemented in the client/server cooperative processing paradigm,| the majority of DLA's AISs are architected as host based processing systems with end-user access through non-intelligent terminals. Much of the processing that the host currently performs, such as screen presentation management, end-user help screens[17], and basic input editing may be off-loaded to intelligent terminals/workstations which are already available on end-user's desks. This can reduce communications traffic between the host and terminal considerably while extending much greater power, ease of use, and flexibility to the end-user. The inclusion of human engineered graphical user interfaces (GUIs) for example, can drastically reduce end-user training requirements while dramatically increasing productivity levels. A client (end-user workstation) and a server (the host computer) where each component of the architecture

[17]A good place to integrate expert system advisors into a major information system. The expert system would act as a supervisor looking over an operator's shoulder to provide advice on how to react to data conditions being observed. Neural network logic could recognize trends or abnormalities over a series of many user screens.

cooperates in doing what it is capable of doing most effectively[18], illustrates the client/server architecture concept. Data base servers and print servers, for example, are fairly obvious examples but the concept extends to all types of services performed by one information systems component[19] for another.

The vision of network computing with its many cooperative processing nodes will not be entered into without careful planning. Although the I/S industry is moving unrelentingly into these concepts[20] because of their ultimate benefits, there are perils to overcome. Notwithstanding the paradigm shift and the attendant cultural change that IRM personnel must undergo, we need to develop techniques and facilities for the care and feeding of this complex environment. For example: software release management across distributed environments[21], innovative licensing schemes for networked commercial software[22], network management facilities, transaction management software[23], operator-less nodes, and end-user problem resolution. These issues will be further addressed in the action plan portion of this paper.

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[18]One should not allow himself to be trapped into becoming either a main-frame or a small-system bigot. All size systems have unique potentials in the client/server environment.

[19]The use of the term "component" in this context means any hardware or software component making up the information system.

[20]I/S industry pundits have referred to the 90s as the decade of client/servers.

[21]Commercial software packages such as NDM (network Data Mover) by Systems Center, Inc. have potential for here.

[22]Floating software licenses and site licenses for a maximum number of users are becoming popular.

[23]AT&T's Tuxedo Transaction Management System has potential here.

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d. TECHNOLOGY POLICIES AND ENVIRONMENT

Information systems technology is growing at an extremely rapid pace.[24] This high rate of growth often renders previously unjustifiable applications suddenly economical. In fact; ignoring certain critical technologies may render a competitive business non-competitive in short order. This makes long range planning more difficult today than ever before. Since long range business planning is imprecise, technology planning must be flexible enough to accommodate many changes in business direction.

DLA is experiencing many changes today; some forced by the new economics of technology, others by new directions in the way DoD is moving in response to budgetary restrictions and its own realizations of current waste and inefficiencies. The creation of a central payments activity, plans to consolidate information processing centers, and DoD's desires to share common applications across its components are manifestations of these realizations.[25]

Thus, DLA will not make inappropriately precise technology plans, but will assure that it embraces appropriate concepts that accommodate change. To do this DLA will assure that it maintains viable conceptual directions (blueprints), and viable application building blocks (HW/SW component platforms). It will utilize general concepts such as cooperative processing client/server architectures and integrated I/S componentry acting as the Lego blocks from which the kinds of systems DLA needs may be engineered.

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[24] According to Peter Burris of IDC (International Data Corporation), the cost performance growth of mainframe I/S technology can be expected to approximate 15% - 20% per year. However, Peter projects that because of rapid advances in desktop and low end minicomputers, that the overall industry installed base of MIPS will experience cost performance growth figures more on the order of 23% - 25%.

[25] The consolidations, although reducing the number of sites and significantly contributing to DoD/DLA cost cutting objectives, will require increases in size and performance of current systems therefore increasing the criticality of operating systems upgrades.

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"STATE OF THE CONTRACT DESIGN" CONCEPT

DLA's Information Systems (I/S) Technology objectives center around the concept of maintaining a complete ¦array¦ of approved technology componentry (hardware/software) that would be sufficient to maintain existing systems and to design the client/server systems envisioned for DLA's future. All components on the list must meet inter-operability and portability standards.

APPROVED CONTRACTS LIST

I/S designs will be required to follow a concept of "State of the Contract Design" which states that only components available on the approved contracts list may be utilized in new system designs. The use of non-approved components will require critical reviews ¦by the DLA organizational component responsible for systems integration¦ to assure that the level of inter-operability and portability is not being jeopardized. The use of approved components will be limited only by the cost/benefits of designing the new functional capability/enhancement.

EARLY DETECTION OF TECHNOLOGY NEEDS

In order that the list remains adequate to satisfy increasing technology demands, DLA will review new functional requirements as early as possible to detect the need for technology that is not currently on the list.[26] When new technology needs are detected, DLA will seek to assure that available contract vehicles are in place by the time that I/S design for the new functional features is ready to begin. Since the concept requires early detection of future functional needs it is evident that precise definition of capacity and quantities may not yet be possible, therefore contract flexibilities such as wide minimum and maximum order quantities, etc. must be negotiated. Thus the concept "State of the Contract Design" reflects the use of the application

[26]DLA utilizes a Strategic Information Asset Planning System (SINAPS) methodology to capture functional requirements and project the types of technology that will be needed.

enablers (hardware/software) available on current contracts as practical technology limitations on design.

JOINT VENTURES

As much as possible contract needs will be satisfied by the use of multi-service contracts which possess a great deal of built-in flexibility. It is expected that the full realization of the benefits of this concept will be the reduction or elimination of the need for large technology acquisitions for specific applications. In recent years DLA has become a partner with the Air Force, the Army and the Navy on joint service acquisitions. DLA now, due to these acquisitions, has a formidable stable of contracts for I/S componentry. Perusal will reveal that these contracts already cover a large portion of DLA's hardware/software requirements.

INTEGRATION GUIDANCE

The technical platform that is developing consists simply of an OSA approved list of componentry from which hardware/software would be selected and assembled into a wide variety of client/server arrangements as determined by the designers to satisfy functional application needs. The approved list will change as new needs are recognized and new approved usages of components are made. Therefore DLA has developed a "Technology Integration Guide" which is utilized by DLA activities involved in I/S design work to assist them in determining the appropriate hardware/software components (the Lego blocks) to utilize in their design. It also provides some degree of configuration aid. The guide includes a summary of outstanding contracts, their contents, their potential use, their duration, technical integration/configuration information, etc. It also contains a summary of ongoing/planned acquisitions with projected dates of availability, contents, potential use, etc., to the extent that the information is not acquisition sensitive.

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OPEN SYSTEMS ARCHITECTURE

At the November 1990 Guide Users Group meeting George Liptak of IBM discussed the results of a survey they had done with their customers. Here are what the customers described as openness:

Multi-vendor inter-operability.

Enterprise-wide information access.

Consistent graphical user interface.

Client/server computing.

Heterogeneous system management.

Application portability.

These descriptions are not inconsistent with DLA's. DLA officially adopted an open systems architecture policy as far back as 1986 with the introduction of its Software Blueprint[j] and other subsequent policies[k],[l],[m]. The DLA IRM Near-Term Planning Document of May 1990[n] re-enforced this commitment to open systems. The Blueprint represented a target for inter-operability and portability which was to be gradually implemented as major reworks/redesigns of existing information systems occurred over time. It remains as a major DLA policy to guide application designs and hardware/software acquisitions. However; the open systems ideals of the Blueprint are not fully achievable without re-engineering DLA's baseline AISs with a view of data resources that goes beyond specific application boundaries. The opportunity for the creation of a fully open environment will be presented when the re-engineering phase, prescribed by this paper, begins.

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COMPUTER ASSISTED SYSTEMS ENGINEERING (CASE)

CASE[27] tools, and the concepts they allow us to realize, may be the only practical way of dealing with the immense complexity of the enterprise's data, process and network architectures[28]. |A standard methodology for performing information engineering is also critical°.|

DLA's legacy application systems, which run primarily in the IBM 370 architectured environment, pose a substantial re-engineering challenge. Most organizations today are maintaining legacy systems and spending more and more money doing it. Charles Bachman of Bachman Associates points out these sobering trends in resource allocations|[29]|:

1975 New Applications 50%
Old Applications 50%

1990 New Applications 10%
Old Applications 90%

DLA's legacy systems form most of the bread and butter I/S capability of the Agency and must continue to operate throughout any transition process. To effectively re-engineer these applications DLA must possess an effective CASE environment of forward and reverse engineering tools, and a method for transitioning the data and processes after the re-engineering is accomplished.

CASE AND OPEN SYSTEMS

The I/S industry is currently divided into two major open systems camps:

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[27]CASE - Computer Assisted Systems/Software Engineering.

[28]"The key technology in the industry is not technology; its application development" - Charles Bachman.

[29]DSAC's PDP records do not match Bachman's statistics. DSAC claims 70% on new functions (Projects) which do discrete new things while performing only 30% maintenance. In other words, Bachman probably counts differently than us.

POSIX[p], which defines a standard interface for operating systems, currently is effectively targeting the UNIX operating system as its base. POSIX is DLA's ultimate objective.

Systems Application Architecture (SAA) is the IBM open systems concept. In order to demonstrate its commitment to open systems IBM has announced that its AIX ¦(a POSIX compliant version of UNIX)¦ will fall under the SAA umbrella. IBM has also announced AD/Cycle (Application Development/Cycle) as the development environment under SAA. Within AD/Cycle is the Repository which is claimed, by IBM, to meet the IRDS[q] standard. Repository is the data base designed to house the entire scope of information engineering metadata from business systems planning through code generation. IBM has recognized its limited ability to provide the full array of CASE tools needed, but has instead, made business partner arrangements with Knowledgeware, Index Technology, Developmate, and Synon. These corporations have agreed to conform to the Repository format with their CASE tools. Many other CASE tool vendors have also agreed to meet the specifications of Repository without business agreements with IBM. Thus; Repository provides a common ground for software industry competition as well as integration for a large assortment of existing and potential CASE tools.

DLA's CASE STRATEGY

Since DLA's primary application systems operate in the IBM environment and current consolidation plans will considerably extend that environment both in time and size, it is imperative that DLA adopt enablers ¦such as¦ ADCycle/Repository and the ¦Cross Systems Product (CSP)¦ in re-engineering its current systems into portable and inter-operable systems. This ¦would allow DLA to use a wide variety of Repository compatible CASE tools from many vendors¦ and would provide flexibility for applications to remain on the IBM environment and to move to POSIX environments during the re-engineering phase.

EMERGING TECHNOLOGIES

Although the following discussion is speculative, there are a number of emerging technologies[30] which could influence DLA during the next 5 years. Each has potential for inspiring innovation among technical and functional proponents. As these potentials surface and are evaluated, the technologies will be infused within the DLA environment. Where there are multiple choices of standards for a particular piece of technology, DLA will adopt those with DoD sponsorship. Where DoD sponsorship is unspoken, industry dominant de facto standards make the most sense. The NIST (National Institute of Standards & Technology) has recognized the value of industry de facto standards[31] as opposed to independently developed government standards which are sometimes available too late and thus receive little use or support from industry technology developers. Natural competition within the I/S industry often results in viable de facto standards which NIST has adopted in the past (e.g. SQL) and which serve the public and private sectors well.

OBJECT ORIENTED

Object oriented design methodologies, object oriented programming systems and object oriented data base systems (OODMs, OOPs, OODBs), although in their infancy (pun intended), are already indirectly affecting DLA. The indirect effect comes from the many vendors whose software DLA uses. Software vendors inevitably claim that their packages are object oriented. Whether or not they really are is debatable, but they all understand the marketing value of the words "object oriented". "OO" is unlikely to directly influence DLA designers for the next two or three years simply because design tools and I.E. methodologies for OO are still immature, there are no standards (De facto or official) that DLA can hang its hat on, and it is another paradigm shift that will take DLA some time to fully

[30]This list is only partial; a full list of potential technologies would be exhaustive.

[31]Structured Query Language (SQL) and X-Windows are examples of DeFacto industry standards adopted by NIST.

understand and appreciate. DLA, as well as most practitioners of I/S, will continue to develop "Relational" systems, for their mainstream applications, over the next several years. However, experimentation will occur in some areas, particularly graphical interfaces where the "object" orientation is most obvious. In the meantime, the implementation of relational systems is a giant step in the right direction and contributes towards an eventual move to OO. Eventually the new paradigm will extend the logical content of an entity from one containing data attributes (Relational) to one containing both data and process attributes (Object Oriented). OO promises to eventually increase the re-usability levels of code (re-usable objects) thus reducing development and maintenance costs. DLA will watch the development of this technology closely to assess the appropriate time for its introduction[32],[33].

IMAGE PROCESSING

Numerous functional requirements are emerging within DLA which require image processing capabilities[34]. These capabilities must span the need to display, store and transmit images. In addition; the ability to handle compound documents will be necessary. Compound documents provide the integration of text, graphics and images. Without this integration much of the practicality of image processing may be lost.

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[32]The Supply Support Planning & Execution (SSPE) is now indicating a need for OODB (Object oriented data base).

[33]The Object Management Group (OMG) has received standards proposals for integrating various types of software objects across diverse networks and platforms; e.g. ORB (Object Request Broker) which is the mechanism by which objects transparently generate and receive requests and responses. - LAN Computing, subject: Object Technologies Proposed as Standards, March 26, 1991.

[34]The CTOL (Cataloging Tools On-Line) contract with the Oracle Complex Systems Corp. contains extensive image processing technology.

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PAPERLESS ENVIRONMENT

Going paperless, |which is probably a long way from being fully achievable|, is a combination of infusing a number of technologies, standards and procedures. EDI, |CALS|, Image Processing, Network Computing and standards such as ANSI X.12 (Data Interchange Standard) and X.400 (Electronic Mail) are all contributors. |The staging of report files to storage for on-line demand retrieval instead of printing could drastically reduce DLA's paper requirements[35].| DLA is aggressive in the paperless area and has already implemented POPS (Purchase Order Processing System), SPEEDE (SAMMS Procurement by Electronic Data Exchange) and EFT (Electronic Funds Transfer). DLA is also working on other applications and an intelligent gateway called LINX (Logistics Information Exchange) which is now ready to implement.

NEUROCOMPUTING

Sometimes referred to as "adaptive systems". Unlike expert systems which use rules, a neuro system can determine the rules through attempts to replicate the brain structure (learning). For the time being, neurocomputing will be an esoteric buzzword in DLA, but will be a technology which DLA will monitor and seek practical applications. For now, here are some more buzzwords to amaze your friends:

Neural Networks	-	Software simulations of neurocomputing containing interconnected processing elements.
Neural Chips	-	Still under development |for business application|. Already in automobile diagnostic systems.

[35]DLA produces approximately 1 billion pages of print per month. We certainly can't be looking at all of that. If equated to book form, that would be approximately 4 books/month for every DLA employee. Quite a reading club!

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NEW LOOK MAINFRAMES

There is a tendency, with all the discussion on distributed processing, distributed data bases, client/server, cooperative processing and network computing, for many people, even I/S professionals, to look at mainframes as dinosaurs. While it is true that systems will have quite different architectures in the future, mainframes are not likely to disappear from the scene[36]. A Datamation article[37] suggested a likely scenario of "New Look Mainframes":

Powerframes -	Characterized by the ability to interface with different forms of databases, these machines have parallel processors sharing an organizationally common memory and storage hierarchy. Their chief task is to regulate the flow of traffic into and out of those databases over a parallel access input/output structure called channel architecture.
Serverframes -	Serve up locally shared databases to a work-group or a single user.
Clientframes -	Home of all new applications and all human interface features, these machines eventually will allow users to automatically generate their own applications.

Because of the tendency for data to migrate upwards from personal to departmental to corporate due to increasing data sharing needs it is quite likely that mainframes will act as relational |corporate| data

[36]Since they do not change the basic systems architectures of the applications, the consolidations will also add to the life of host based systems which are currently running on main-frames.

[37]Datamation magazine, June 15, 1990, page 188.

warehouses in the future. Other roles will be to act as high speed transaction processors and network managers.

GRAPHICAL USER INTERFACES

Graphical User Interfaces (GUIs) have been available for several years. The big question is that of, which one(s) to choose for DLA usage. Currently there are several viable contenders[38]:

Microsoft Windows 3.0

The most recent entry into industry competition; and probably the most widely implemented. 3.0 has taken the industry by storm with its Macintosh-like interface and its ability to extend the life of MS/DOS systems by its extendibility of addressable memory to 16 megabytes. On a 386 system, it also provides virtual memory operation. Windows is available to DLA through the DESK-TOP III contract increasing the potential of establishing itself as a practical standard, not only in DLA but in other DoD activities.

OS/2 Presentation Manager

IBM's bid into GUI competition. Since it requires OS/2 it is not likely to become a DLA standard[39]. However, if CASE competition were to result in a DLA acquisition of AD/Cycle, OS/2 would be selectively installed in DLA's I.E. activities. AD/Cycle, among other things such as DB2 on the mainframe, currently requires OS/2 on its work-stations.

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[38]In the near-term, the most likely candidates for DLA's application development are Microsoft's Windows 3.0 for DLA's DOS environment and X-Windows for the UNIX environment.

[39]Microsoft is rumored to be working on a New Technology (NT) kernel for OS/2 that would support Windows, Presentation Manager and POSIX. If this is true, OS/2 (because of POSIX compliance) would be acceptable to DLA. - LAN Computing, subject: Standards Watch, March 26, 1991.

Standards Organization's GUIs
There are several standards organizations sponsoring GUIs |which are based upon the same X-Windows',[40] platform|. Among these GUIs, |which differ only in their "Look and feel"|, are:

Open System Foundation's Motif

UNIX International Inc's Open Look

X-Windows

INTEGRATED SERVICES DIGITAL NETWORK (ISDN)
ISDN offers an all-digital service which reduces errors and cost and provides the capability of carrying many networks over a single link. It allows the integration of voice, data, and image services through twisted-pair telephone wire. The ability to access separate networks through a single plug in the wall has obvious advantages to subscribers. Some of the ISDN services such as broadband and numbering and addressing for the U.S. market may not be available until after 1992 when the CCITT[41] four year study period is completed.

e. **ORGANIZATIONAL ENVIRONMENT**
One can determine the number of Information Processing Centers (IPCs) that are necessary simply by considering an IPC as a utility for processing information systems applications. That approach would base the determination of the number and location of sites on the number and sizes necessary to perform the workload while providing a certain amount of physical separation and redundancy for the level of security desired. There is nothing wrong with this approach; |in fact it is the ultimate DLA goal for operations|. However; DLA's Conceptual Functional Requirements identified five Business Areas which were reduced to four in the DLA

[40]Portions of the X-Windows system specifications were adopted as a Federal Processing Standard in May 1990.

[41]International Consultive Committee for Telephone and Telegraph.

Strategic Plan. These areas now are |Acquisition Services, Material Management, Distribution Services and Corporate Support|. Information Resources Management is a critical factor in the success of all the Business Areas and may be considered |as if it were| a Business Area in its own right, thus increasing the count back to five|[42]|. This paper prescribes an IPC |as the operational center| for each of the major business areas as an appropriate way to delineate workload. This gives each IPC a personality and potentially a greater feeling of responsibility for an area of DLA's mission, rather than the "push a button, grab a banana approach" that the non-distinct IPCs would foster. |This association is considered necessary, at least temporarily, as a transition step to the utility approach where IPCs have no specific DLA functional mission identity.|

To the extent possible, application development activities |will| actually be co-located with representative clusters of end-users in order to facilitate user participation in information engineering and prototyping for application development.

Since the prescribed methods of this paper focus on keeping data separate from applications, a valid option would be to include the application development groups as an organizational part of the PSE's whose functions they automate. Although this is not currently being prescribed, it could become a viable option after the re-engineered environment is normalized|[43]|.

AUTHORITIES AND RESPONSIBILITIES

DLA's information resource management organizations provide information services to enable the performance of the business processes defined by DLA's Principal Staff Elements (PSEs). These business processes are executed by end-users within DLA and by many outside activities that are recipients of DLA's functional supply and other logistics services. In order for DLA's

[42]IRM is the main business area of the DLA IRM organization, although IRM is not a DLA business area.

[43]Theoretically; when all enterprise information engineering metadata from business objectives, functions and entities through detail action diagram level logic blocks are housed and maintained in a common repository, application development and revision will amount to the changing of business rules and procedures and generating new business foundation code modules.

information system service organizations to properly interpret the business needs of the PSE's, develop the enabling information services, and to effectively manage and operate the information systems, it contains headquarters, design and operational elements. These elements are assigned unique responsibilities to assure that the services needed are provided and that they are provided in an efficient and cost effective manner.

HEADQUARTERS ELEMENT

The headquarters unit is expected to interface with the PSEs to determine their functional needs and to communicate these functional needs to design units for design and implementation. The headquarters must provide policy guidance and monitor design and operational activity to assure that the Agency's information resources are designed and operated effectively and economically and that they meet the business needs of the PSEs.[44]

DESIGN ELEMENT

The design element interfaces directly with the end-users to meet their operational needs while performing detailed information engineering of the functional data and process needs of the PSEs. The design elements develop operational information systems and integrate them into other systems in operation at each of the information systems operational elements.

OPERATIONAL ELEMENT

The operational elements manage and operate the information systems resources assigned to them in the most cost effective way possible to satisfy the demands of the end-users.

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[44]Management indicators such as the information resource costs by site for processing, requisitions, material release orders, contracts, etc. and customer service satisfaction levels would be major factors in determining IRM's cost/effectiveness.

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INFORMATION FLOW REQUIREMENTS

In order that the three types of information system services elements operate as an effective team in the spirit of Total Quality Management (TQM) it is necessary to define the critical interfaces and information flow requirements that must pass between them. Failure to interface and to pass the necessary information may effect the efficiency and cost effectiveness of DLA's information systems services. Encl. 10 reflects the necessary interfaces and data flows.

PRESCRIBED ORGANIZATIONAL STRUCTURE (See encl. 1)

The Corporate IRM Official would have the ultimate responsibility for all DLA information resources. All IRM organizations would report to this official.[45]

CORPORATE IRM POLICY GROUP (Headquarters Elem.)

A Corporate IRM Policy Group would be responsible for all IRM policy. This responsibility would include overall IRM Comptroller authority. In addition the IRM Policy Group would be the first-line interface with PSEs for determining and recording[46] overall DLA Business Requirements. This group would be physically co-located with the Corporate IRM official and the DLA Principle Staff Elements (PSEs).

CORPORATE I.E. & TECHNOLOGY CENTER (Design Elem.)

This center would provide all information technology to the functional IPCs and other ITFs. It would provide the Corporate Mutual Interest

[45]Headquarters, Design, and Operational sites will be collectively referred to as Information Technology Facilities (ITFs) in this paper.

[46]All business objectives, strategies, requirements, etc. would be recorded in the DLA Enterprise Model Repository. The same repository would be utilized by all IRM organizational elements. Thus, the repository would retain all of the enterprise's information system metadata from the highest level business objectives through action flow information needed for code generation. All systems would be maintained by modifying this repository and generating new code as necessary.

Back-up (MIBS) and I.E. environments for all IPCs. It would develop, administer and control the integrity of the Corporate data base (the physical data base may be deployed at the IPCs as appropriate)|[47]|. It would develop, administer and control the Corporate wide-area communications networks. It would be the central design activity for all information system applications, |even though| to the extent possible, application development personnel would be co-located with clusters of end-users to facilitate user participation in application development.

|In short; this center creates and manages the Agency's lego blocks (data, process, technology). It also provides support and control for the Agency's shared resources (data base, communications network, backup environment) and performs standard application development.| (See enclosure 2).

INFORMATION PROCESSING CENTERS (IPCs) (Opns Elem.)
The IPCs would provide all operations and end-user support to mission function and DLA administrative support applications. The following IPCs would be established. (See enclosure 3)

Corporate Administrative Support
Material Management
Distribution |Services|
Acquisition |Services|
Corporate I/S Development & MIBS[48],*

[47]The ultimate integrity of data is controlled by the functional proponents (PSEs) through meticulous application of operational business transactions. IRM however, is the custodian and must assure the safeguarding and physical integrity of the data base.

[48]The notion of forming an IPC for the I/S development operational environment was first put forward by J. Froehle and E. Troupe of DSAC during a brief to DLA-Z. The notion treated I/S Development as any other operational application and opened the possibility for DLA-Wide sharing of development tools (repository, languages, etc.). Thus only one Agency license for development tools would be necessary, regardless of where the developers may be.

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3. MIGRATION OPTIONS

DLA, like virtually every other major organization that has developed information systems over several decades, has tended to create application data bases, not subject data bases. This means that DLA has many data bases and files that are tailored to a specific application's needs. Efficient yes, for that application; but the next application in turn has its own data base, and so on. This can and has resulted in overall data redundancies and inefficiencies in the use of data resources. DLA is serious about sharing data across applications, and is developing concepts and facilities for transitioning its applications and data bases.

a. **CHALLENGES** (See figure 1)
The difficulty in transitioning from application to subject data bases has been the nemesis of many IRM organizations.[49] A partial reason for this difficulty is the change from the one-to-one correspondence of application-to-data to a many-to-many. This means that straight conversion lines can't be drawn from the old data bases to the new ones. If the applications are to be re-aligned also, one is forced to make the decision of converting data bases first, or conversely applications first. All-at-once conversion approaches generally are discarded up front because they are usually too big to handle, although one approach called ANDES (A New DLA Environment Seed)" rationalizes a means of making a fresh start feasible |without heavy bridging requirements|. |Excluding the ANDES approach|, either choice; data first or application first implies a need for bridging from the old to the new systems that have not been fully converted. These bridges can prove to be costly and long-lived legacies.

In any case, even if a decision were made for one general transition approach over the other (data-first vice application-first) it is unlikely that all data or applications

[49]"The seamy side of I/S is imprecise, inelegant, and difficult to describe, but it addresses the most serious problem facing many companies." - Roger Buchanan; in Explain Magazine pp 19-22 article titled "CASE TOOLS: DATA MIGRATION", date of issue unknown.

could be transitioned simultaneously. All-of-the-data or all-of-the-applications |in one-fell-swoop| would still be too much.

b. GENERAL APPROACHES

CROSS MODEL RESOLUTION APPROACH (See enclosure 4)
DLA has initiated a research and development project to acquire and/or develop a reasonable means by which to facilitate the transition of DLA's information systems and data bases to target designs. DLA can be certain that the target data models (when completed) will not totally match real-world data bases for some period of time, therefore DLA intends to bring about a technical facility that will provide cross-model-resolution. In other words, DLA will initiate re-engineering and conversion projects which reference new target data models even though the real-world data has not yet been converted. The cross-model-resolver's (XMR) function would be to provide the new target view of data to the applications and end-users while delivering data from the old file and data base structures transparently. The actual data will then be gradually migrated over to the target structures, eventually eliminating the need for the XMR.

CROSS MODEL SERVICE AND TECHNICAL REQUIREMENTS
An acceptable Cross Model Resolver facility must meet the following minimum requirements:

The XMR must provide these services:

TARGET MODEL VIEW: Provide for end-user and computer-to-computer client viewing of the data model and delivery of real-world data to be in the target model view.

TRANSPARENT RESOLUTION: Perform transparent cross model resolution from target to existing data models.

The XMR must satisfy these technical requirements:

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ON-LINE DATA MODELS: Provide on-line storage, access and maintenance of data models (Entity Relationship Diagram metadata) for:

Target data models.

Models of existing data structures.

SQL SERVER: Act as an SQL (Structured Query Language) server to a client. A client may be an end-user workstation SQL interface or an application passing SQL through an inter-program call.

METADATA MODEL STORAGE: Store the data models in compliance with the IRDS (Information Resource Dictionary System) standard. See DODD 5000.11 "DoD Data Administration". If the IRDS standard does not cover the necessary formats, the IBM AD/CYCLE Repository metadata formats may be considered for use. This would require review and approval by DLA-ZI (Systems Integration Division).

PORTABLE LANGUAGE: Be developed in a portable language such as "C" or "Ada". Careful attention must be paid to the economics and supportability of the choice.

PORTABLE ENVIRONMENT: Develop shared server executables for the POSIX environment and the client workstation executables for MS/DOS environment. Development of client workstation executables for POSIX is not mandatory at the current time but will become a requirement later.

DISTRIBUTED PROCESSING: Be capable of operating in a distributed processing mode, either in a workload balancing or

distributed transaction mode, or both, to eliminate capacity and performance constraints of a single box. See enclosure 12.

METADATA MODEL MAINTENANCE: Provide a means of maintaining the data models as changes are necessary. The models will change as the target fluctuates and as real-world data is migrated to data bases representing the target models.

DECISION STORAGE: Provide for the storage and maintenance of management decisions regarding the resolution of illogical data model conditions such as, which data attributes (elements) to use when the attributes are located redundantly (with perhaps different values) in multiple separate existing files/data bases.

ON-LINE MODEL GUIDE: Provide for observation of the target data model(s); either on-line or through hard-copy user guide form. On-line should be considered as the primary mode of viewing. The on-line viewing of the target model must be color coded, e.g. "Green" would indicate that data is available from the real-world through XMR, "Yellow" would indicate that data is available but that performance penalties may be expected because of strong model incompatibilities, "Red" would indicate that the data is unavailable in the real-world either because it doesn't exist or because it is on unaccessible media such as magnetic tape or printed paper.

SHARED EXECUTABLES: Locate the executable for the server portions of the XMR in shared (shared by multiple clients) facility(s). This executable would perform functions such as accessing, analyzing, and resolving differences from the target and the real-world data models, network gateways, accessing and formatting real-world data in accordance with SQL commands received from clients, delivering data requested

by SQL to the client, etc. It would be acceptable for this portion of the XMR to co-reside with other applications.

END-USER EXECUTABLES: Locate the human end-user client executable in the end-user workstation (e.g. Presentation management, interactive SQL developer, etc.).

OTHER EXECUTABLES: Locate other client executables such as functional application server inter-program call mechanisms in the processor box(s) of the client application.

SAVED SQL: Provide means for end-users to save and re-execute SQL that they have entered.

TECHNOLOGY INTEGRATION: Comply with technology integration policies and objectives of the DLA IRM Near-Term Plan and other documents referenced by the plan.

NON-TECHNOLOGY FACTORS CRITICAL TO SUCCESS OF XMR

COMMITMENT TO STRATEGY: Once the cross model resolver or other transition strategy is proven to be viable, a DLA commitment to that concept and strategy would make it achievable.

DATA ADMINISTRATION: A serious data administration function is necessary to:

a. Develop target data model(s).

b. Develop "real world" data model.

c. Develop and execute a strategy (sequence of data base/data attribute moves) for transitioning from the target to the real world models.

d. Maintain the target and real world models throughout the entire transition.

FRESH START APPROACH (See figures 2, 3 and 4)
The following discussion rationalizes a means of making a fresh start in developing new systems without the legacies of the past.

THE MOST DIFFICULT THING ABOUT MODERNIZATION IS THE TRANSITION - From an information systems point of view the real significance of the transition is a concurrent realignment of computer applications and data architectures. The migration from DLA's application data base environment to a subject data base environment is not possible through a one-to-one conversion process since the correspondence between data and applications will no longer be a one-to-one. Realignment of applications at the same time further complicates the transition. From a broader perspective, DLA organizational and functional changes |could| create even further complications.

CHANGING IN PLACE IS DIFFICULT - The inertia of existing organizations, functional and systems methodologies will create a resistance to change that should not be ignored. Virtually any concept of migration requires the building of bridges connecting the old to the new until transformation has been completed. Most of the bridges will be data bridges designed to keep old and new data bases in synchronization. Whatever they are, bridges add to complexity and may create |additional legacies| that may still be around for decades. Any attempt to change in place will result in compromises between the old and new which may result in a condition where the new never |quite| reaches the goals for which it was to be designed.

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A NEW ENVIRONMENT UNCONSTRAINED BY THE OLD IS POSSIBLE - In order to believe that modernization is feasible to implement, one must have confidence that the functionality described in |the business| requirements can be developed anew. Because of realignment of data and applications, old code is not directly transferable. Even if there were no realignment, the systems |will| need re-engineering before they become totally unmaintainable. With recent developments in systems design and development technology it can now be considered acceptable to throw away (or reverse-engineer to an acceptable base) old code investments and re-invest in forward re-engineering for the long-term benefit of the Agency. Recoding is further simplified by the diminishing need to identify all of the functionality hidden in "Unique Code" residing undocumented throughout the Agency. As appropriate, end-user programming will take up the slack left by the lost undocumented functionality of the "Uniques"|[50]|.

A NEW DLA ENVIRONMENT SEED - A migration course that may virtually eliminate |the need for| bridges and their inherent costs, while at the same time reducing overall transition risk to a minimum, is the creation of a seed activity for the future DLA. This seed would be given its own mission and functions and would in effect be a miniature version of DLA operating under rules similar to Model Installations Program rules. The seed would require a computer site in which the future applications and data bases would be developed and run in miniature until all of the functionality required by DLA is in operation. The seed could at first be given a few stock classes to manage (a few hundred items) from a relatively straightforward commodity such as electronics. It would also be given some small category(s) of contracts to administrate. Personnel from the PLFA's would be designated as part of the seed environment. They could either work from their

[50]Many of DLA's so-called "Uniques" are data extracts from existing files. End-user programming through friendly interfaces (which generate SQL under the covers) should handle most of these needs. Care must be taken however to assure that these uncontrolled requests do not overload the environment.

present locations or be provided office space close to the seed. They would perform their normal (or redesigned) functions such as supply control analysis and contract administration through the new seed system|[51]|. As the seed achieves success in managing its mission it would be expanded to include new classes which would include unique problems from such areas as fuels, perishables and more complex contracts. This concept would substantially reduce overall risk and start-up costs and permit expansion as budget allows.

SOWING THE SEEDS - Once an information systems seed is fully operational it can either become an IPC or be exported to the IPCs.

[51]Because the ANDES approach is not constrained by the legacies of the past, new paradigms such as the "Product Manager" concept would be much easier to implement. The "Product Manager" is the embodiment of several legacy positions; Engineer/Cataloger, Item Manager, and Buyer. The same considerations are true in implementing the new distribution paradigm of "Just-In-Time" as appropriate to the commodities being managed.

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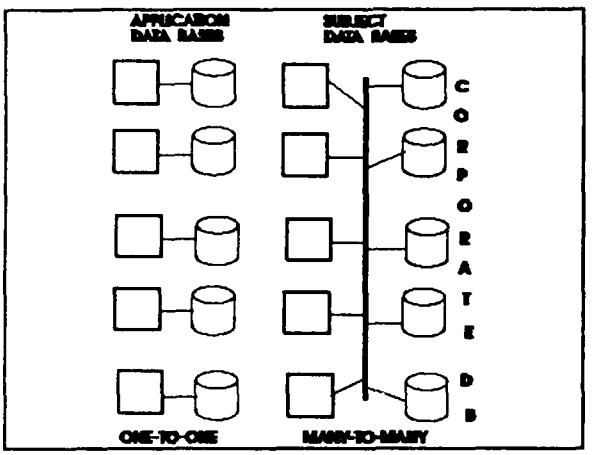

Figure 1 Migration Challenge

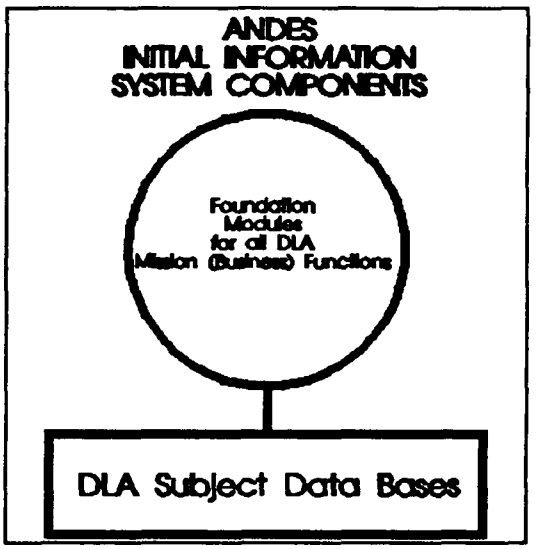

Figure 3 ANDES Foundation

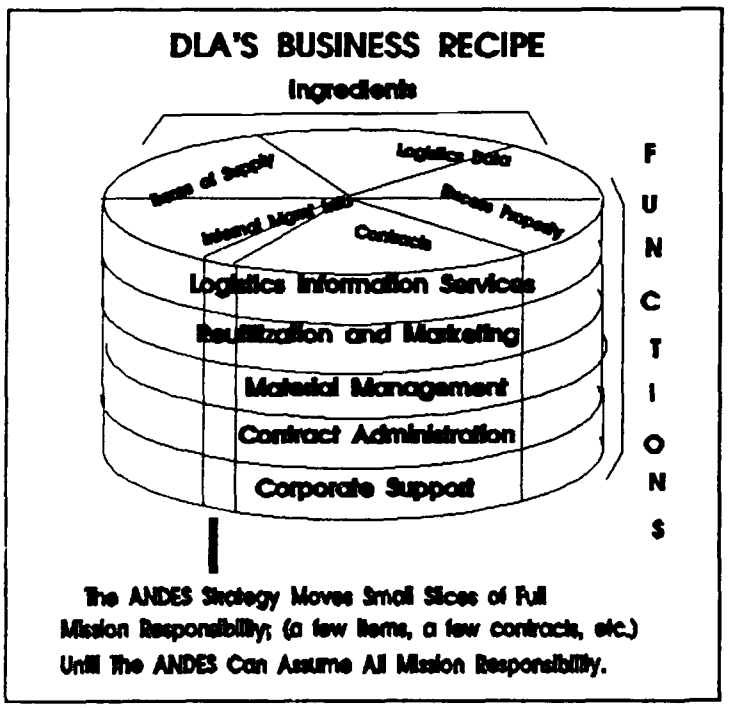

Figure 2 ANDES Strategy

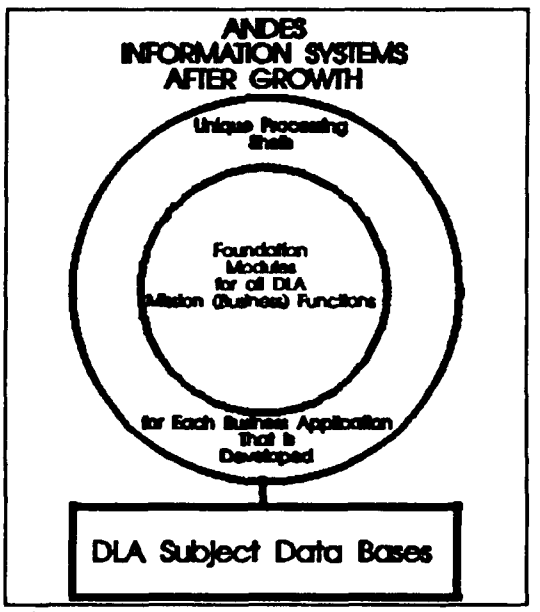

Figure 4 Full Grown Systems

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4. ALTERNATIVE IMPLEMENTATION STRATEGIES

Executive level plans for alternative implementation/migration strategies are presented here. The alternatives have far more similarities than dis-similarities. Both assume a normal resumption of activity after the current IPC consolidations and "Interim Standard Systems" implementations before they would begin. Both are critically dependent upon the full information engineering of data and processes to determine subject data bases and foundation application modules. Both include the use of CASE, the inclusion of IRM business entities in the corporate data base, and so on. While the first alternative is critically dependent upon the existence of cross model resolution facilities, the second could use but would not be dependent upon cross model resolution. A third alternative is to withdraw plans for sharing data by way of common data models and subject data bases.

a. **CHANGE IN-PLACE (CIP)** (See enclosure 7)
The first alternative describes a scenario whereby the envisioned IRM environment is achieved through a gradual process of re-engineering the applications and data bases until the entire transition is completed. Since the strategy evolves the DLA IRM environment in-place, it will be referred to as the CIP (Change-In-Place) strategy. This strategy requires heavy use of cross model resolution facilities.

b. **A NEW DLA ENVIRONMENT SEED (ANDES)** (See encl 8)
The second strategy actually creates a new environment beyond the existing DLA environment. DLA mission functions would gradually be transferred to the new environment as it grows in capability to accept them. This alternative will be referred to as the ANDES (A New DLA Environment Seed) strategy. This strategy may be supplemented by the use of cross model resolution facilities. |For example: cross model resolution may be used to provide early-on MIS-like access to existing data structures on a query-only basis. This would have the effect of satisfying pent-up demands for information from existing files while the new systems are being developed under ANDES. This may reduce some pressure on the ANDES efforts and may help to thwart otherwise hasty decisions that could reduce the effectiveness of the new systems.|

c. **CHANGE OF PLANS (COP OUT)**

A third alternative is to withdraw plans for the sharing of data by way of common data models and subject data bases as specified in DLA's CFR and Strategic Plans. This alternative would mean that data could be shared across incompatible and often redundant data models by way of communications gateways into non-integrated applications. In the worst case it could mean that no attempt at data sharing will be made, and that applications would continue on with their insular use of data. This is a status quo alternative. Since DLA's requirements and objectives state the Corporate Data objectives (single-image), the requirements and objectives should be changed if this option is decided upon.

5. FUTURE VERSIONS OF VISION AND PRESCRIPTION

¦Because of its wide scope, the potential material that could be covered in this paper is virtually infinite. In order that this version be delivered for review and comment, an arbitrary stopping point was established. Otherwise one could go on writing forever with no conclusion. This version establishes the current official IRM policies and directions. Future policy and direction changes may require revisions. Comments and suggested expansions received on this version will be evaluated and incorporated to the extent possible and new versions will be published as necessary. The Director, DLA Office of Information Systems and Technology will make final determinations on policy and direction changes. These decisions will take the form of re-endorsement of later versions of this paper.[52]¦

Some additional topics, inserts and enhancements to this paper are already being considered and researched. This section will act as a holding place for these random thoughts. The thoughts may find their way into future versions of this paper, or better yet, into implementations¦¦. For example;

Include a discussion and chart depicting IRM activities, PSEs and end-users sharing a corporate repository to describe, develop, generate and maintain application systems. Talk about how all life cycle development (Requirements, analysis/design, development, build and test) becomes maintenance of the repository.

Discuss the need for a single point of entry for transactions into DLA with automatic routing to appropriate sites, facilities and applications. ¦Also discuss how data should always be entered into the system at the point of creation.¦

Discuss capacity management in the client/server environment as opposed to the host/centered environment. Client/server opens up opportunities for intelligent modular upgrades without the need for full system replacements each time capacity is outgrown. This would make the need for long range capacity projections less critical.

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[52]Yogi Berra also said; "When you come to a fork in the road - Take it".

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Discuss the use of reverse engineering as a supplement to re-engineering. Old data bases, in particular, may be reverse engineered then forward engineered to the corporate data model. Old applications are more difficult to reverse engineer, but there is potential there also.

Discuss what the consolidation environment will probably bring and how it may help in DLA's re-engineering phase. Systems Application Architecture (SAA), System/390 era hardware technology, applications running in PRISM or PRISM-Like split system environments.

Discuss data distribution. Personal data on workstations; departmental data on LAN SQL servers; corporate data on WAN SQL servers. Data distribution is driven by the need to share. When several people need to share personal data it moves up to departmental; when several departments need to share departmental data it moves up to corporate.

Include a Venn diagram of organizational interfaces with an affinity analysis determination to aid in the placement of personnel.

Include an analysis of specific migration tools needed to enable DLA to adjust to the new paradigms.

Discuss the potential for hypermedia technology in the emerging technologies section.

Include more discussion on the enterprise model; what it is, how it is used, what value it adds. Visual abstraction of the enterprise. Manage the enterprise with the model.

Include an analysis of the type of people needed to staff the various IRM elements. E.g. Headquarters is not a good place to develop inexperienced IRM people. They need to be experienced when they start in headquarters or be detailed to field jobs as headquarters interns.

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Include more discussion on expert systems - Expert system is the co-pilot; operator is the pilot. In other words, the expert system is only as good as the pilot's talent, training and experience. Remember that when CASE is used.

Take Zachman's framework and add players at the various levels. Data analysts, systems analysts, database administrators, programmers, etc.

Expand the discussion on organizational structure to more detail on responsibilities of various elements. Include explanation of the MIBS (Mutual Interest Backup System); how it will work, how it will be managed.

Determining how and when to incorporate comments, especially when conflicting comments from various organizations are received, is never easy. Hopefully justice has been done; however the consequence of some comments received on the Strawman may only be partially addressed but not fully decided in this version. Although this version represents DLA's current official position, the following comments may elicit future changes:

From DLA-L - "We didn't see the total integration of the IPCs, ISCs and the ICs discussed in this paper. The direction that has been set forth in DMRD-924 (IPC & CDA consolidation) will determine all DoD components future IRM environments. This vision paper must reflect the changes that will be made in DLA's IRM Program including the AIS Executive Agent Charters."

From DSAC - '"Organizational Environment" - Nonconcur with the strict endorsement of "functional IPCs". Economies dictate that DoD and DLA take a "utility" approach such as was defined in "magnet centers". The "account manager" concept should be employed to address application developer and end-user relationships. This is also true for production system operations activities. The entire organizational environment including the interrelationships between HQ, Technical Services Organizations, Development Activities, IPCs, PSEs and end-users needs to be addressed very quickly.'

From DSAC - "Migration Options - Another migration option may be to establish the "information processing" concept which migrates all data to on-line information process and decision support systems consisting of new relational subject area data

bases. Updates would be performed on the existing systems and either pre-aggregated or relational data would be created and provided to "information centers" to be used for processing information requests."

From DSAC - "Security is a principle element that needs to be addressed. DSAC is concerned that this vision seems to leave security control process outside of the basic platform evolution. In our view, the security issues of process integrity, data integrity, effective and efficient user identification/authentication and management must be recognized as an integral part of the IRM process."

From DASC - "Expand to include ICs in DLA. IC organization provides end-user support."

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VISION AND PRESCRIPTION

6. EXECUTIVE SUMMARY

This paper prescribes a re-engineered IRM Data, Process, network, technology and organizational environment targeted for the mid-1990s and beyond (after the consolidation environments are normalized). Since there is no certain way of knowing the impact of programs such as the CIM, this paper is designed to be as generic and flexible as possible. It is also recognized that any new efforts without a CIM label are unlikely to be funded in the next few years. Because of that practical reality, DLA can only continue to prepare for rather than execute specific aspects of this paper's prescription which require investment funding.

The concepts, policies and facilities prescribed in this paper are appropriate whatever the consequences of the programs in progress today. They may be applied to DLA or to DoD; corporate data may be scoped by DLA mission area, by DLA in total, by a DoD mission area or by DoD in total. The concepts remain appropriate regardless of scope. There is no attempt to design DLA's future systems but to prescribe environment and migration necessities which will assure a cost/effective operating environment for IRM. These concepts include the sharing of data across the corporate scope, the treatment of IRM as a mission essential management entity with its own I/S needs, the development of common applications architectures assembled from foundation application and technology components which can be considered the Lego blocks from which all systems are built, the vision of network computing where the network is the computing environment not just the communications link, the policy of "State of the Contract Design" to assure integration and to eliminate waiting for acquisitions at critical times, the adoption of standards assuring an open systems environment with flexibility, the use of automated systems engineering enablers to cope with the enormous complexities of enterprise-wide analysis, the infusion of up-to-date cost effective technologies, and an organizational environment that is flexible but firm in its commitment to providing cost effective support to its customers.

Although this paper prescribes an environment that is expected to be cost effective, DLA will continue to be constrained by inefficient acquisition methodologies. While DLA is unable to fundamentally change the acquisition rules, it is hoped that its "Design to the State of the Contract" policy makes them viable.

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Full achievement of the environment prescribed by this paper requires fundamental paradigm shifts in information systems design, technology usage and personnel organization. Because of the difficulties inherent in paradigm changes, the paper pays particular attention to potential migration strategies. A concept for cross model resolution which allows continuous re-engineering of applications while data is being asynchronously migrated is being researched. The paper describes combinations of scenarios for implementation using cross model resolution as the primary "Change in Place" implementation mode and a fresh start approach referred to as "ANDES" (A New DLA Environment Seed). DLA must decide which alternative to adopt and dedicate resources to it. Considerable long term gains are achievable if DLA does the up-front investment in re-engineering. The longer DLA continues to add-on and modify existing systems without fundamental re-engineering the more inherently inefficient they become.

Because of the current IPC consolidation scenarios that are already under way, it may appear that DLA may have five or more years before it should start filling the prescriptions of this paper. While this paper may describe an environment that DLA may want to achieve, it does not pretend to be fully detailed. Much work needs to begin now, in parallel with the consolidation efforts, to complete the picture and to assure that DLA is prepared to absorb the significant paradigm shifts that are inevitable. Regardless of what the additional detailing of this prescription may reveal, it is paramount that DLA not delay development of Corporate data and process models utilizing good information engineering methodologies. Without these models DLA would have no defined target to strive towards[53]. These models are necessary for change in any conceivable scenario other than continued cluttering of the present systems, which at one time were functional/technical marvels, but are now unable to extract the maximum advantage and efficiencies achievable through current technology and concepts of information systems.

[53]Have you ever put a jigsaw puzzle together without the picture?...Lou Tine

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REFERENCES:

a. **Preceding DLA Information Resources Environment Vision and Prescription papers:**

> **IRM Environment Vision and Prescription,** Strawman Paper, Version 1.0, 25 November 1990, DLA, Consolidation of IPC and Central Design Activities Program Office. (This was the original unsigned version which was used to test the water and solicit comments.)

b. **Conceptual Functional Requirements 1988,** Defense Logistics Agency.

c. **Supporting the Armed Forces, 1988 Strategic Plan,** Defense Logistics Agency.

d. **Defense Management Report Consolidation Study - Consolidate ADP Operations and Design Centers in DoD, Volume I Executive Summary OSD Plan,** Draft, Submitted by DC(IRM), May 1, 1990

e. **Defense Management Report Consolidation Study - Consolidate ADP Operations and Design Centers in DoD, Volume II Service Agency Plans,** Draft, Submitted by DC(IRM), May 1, 1990

f. **A framework for information systems architecture,** by J.A.Zachman, IBM Systems Journal, Vol 26, No.3, 1987.

g. **Letter; Subject: DLSC's Future Role,** DLA-S, dated 5 Oct 1990.

h. **Application Architecture - Modern, Large-Scale Information Processing,** by Laurence J. Best, John Wiley & Sons, copyright 1990.

i. **DLA Information Systems Technology Posture,** Systems Integration Division, Office of Information Systems and Technology, by Bob Knez and Deane Erwin, August 1990

j. **DLA-Z letter, subject: Adoption of the DLA Systems Software Blueprint, dated 8 Sep 1986 and attached DLA Software Blueprint,** prepared by DSAC System Software Blueprint Task Group, dated 23 June 1986.

k. **The DLA Open Systems Architecture for Information Systems, Strategic Technology Planning Office**, HQ DLA, Alexandria, Va. dated February 1990.

l. **DLA Open Systems Inter-operability (OSI), Inter-operability and Transition Plan**, 14 September 1989, Working Copy, DLA Office of Information Systems and Technology, Cameron Station, Va.

m. **Strategic Architectural Objectives**, Working Copy, 25 April 1989 and 31 January 1990, DSAC-X

n. **DLA Information Resources Management (IRM) Near-Term Planning Document, FY 90-92, May 1990.**

o. **DLA Systems Modernization Methodology, Information Engineering Approach** - Draft - Version 4.0, 6 August 1990.

p. **Portable Operating System Interface for Computer Environments**, IEEE Std 1003.1 1988, adopted in FIPS PUB 151.1

q. **Information Resource Dictionary System (IRDS)**, American National Standard, ANSI X3.138-1988 - Adopted in FIPS PUB 156.

r. **FIPS PUB 158** - Federal Information Processing Standards Publication - The User Interface Component of the Applications Portability Profile - U.S. Dept. of Commerce, NIST - 1990May29.

s. **Briefing to DLA-Z on 4 October 1990 on Host Technical Environment**, Inter-Office Memorandum, DLA-ZI, November 1, 1990.

t. **Feasibility of Transitioning to Subject Area Databases**, MITRE Corporation, by Ruth Buys, Ruth Hildenberger and Ronald Schwarz, July 1988.

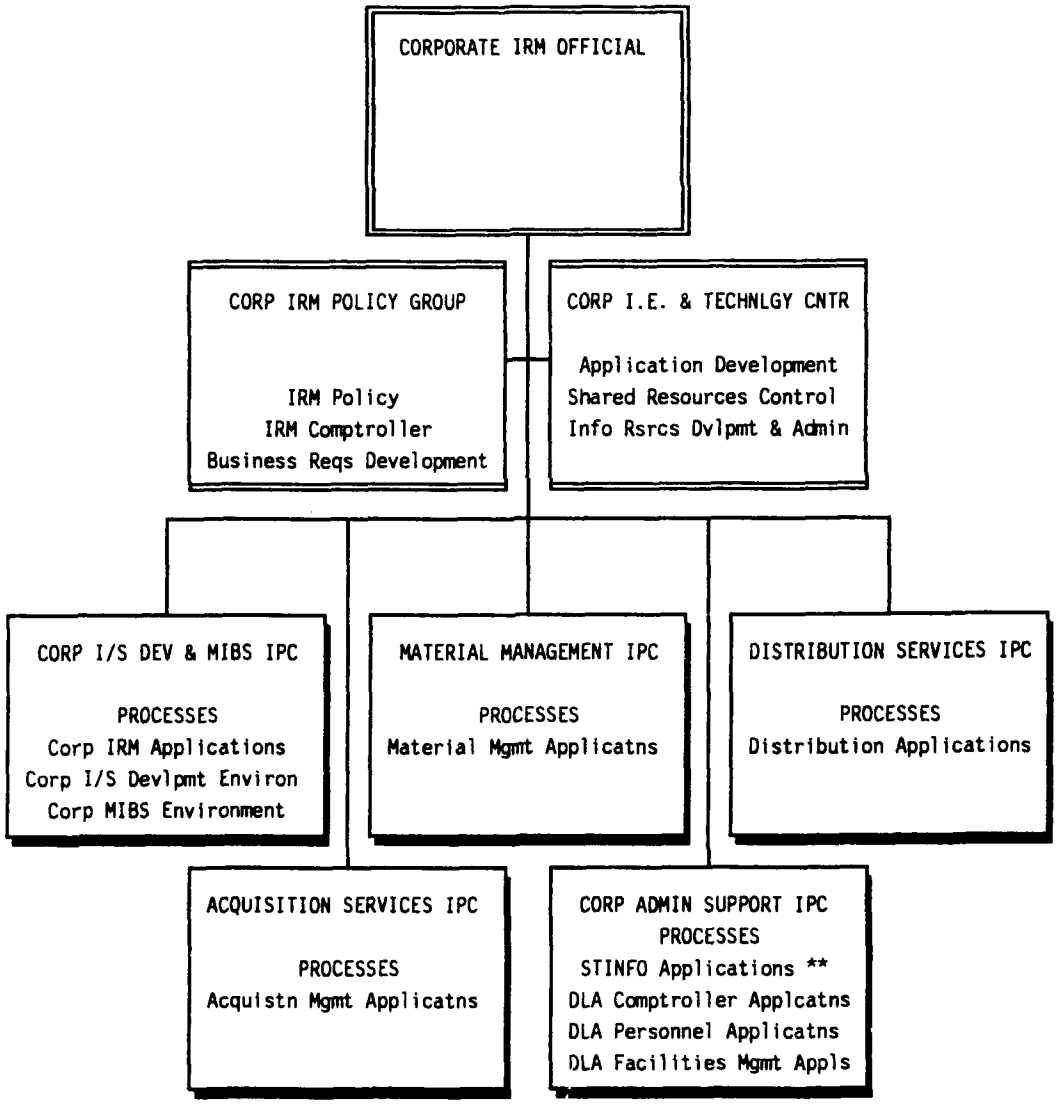
u. **ANDES (A new DLA Environment Seed)**, Thinking paper, by Bob Knez, 8 April 1988.

v. **Cross Model Resolver (XMR) Research and Development Project description**, dated 28 June 1990.

DLA INFORMATION RESOURCES MANAGEMENT
ORGANIZATION STRUCTURE
CIRCA 2005 AD

This chart represents a potential DLA IRM organization structure for the prescibed re-engineered environment.

The actual number of IPCs is not significant to the concepts presented. Decisions made by DLA and DoD consolidation projects will set the number.

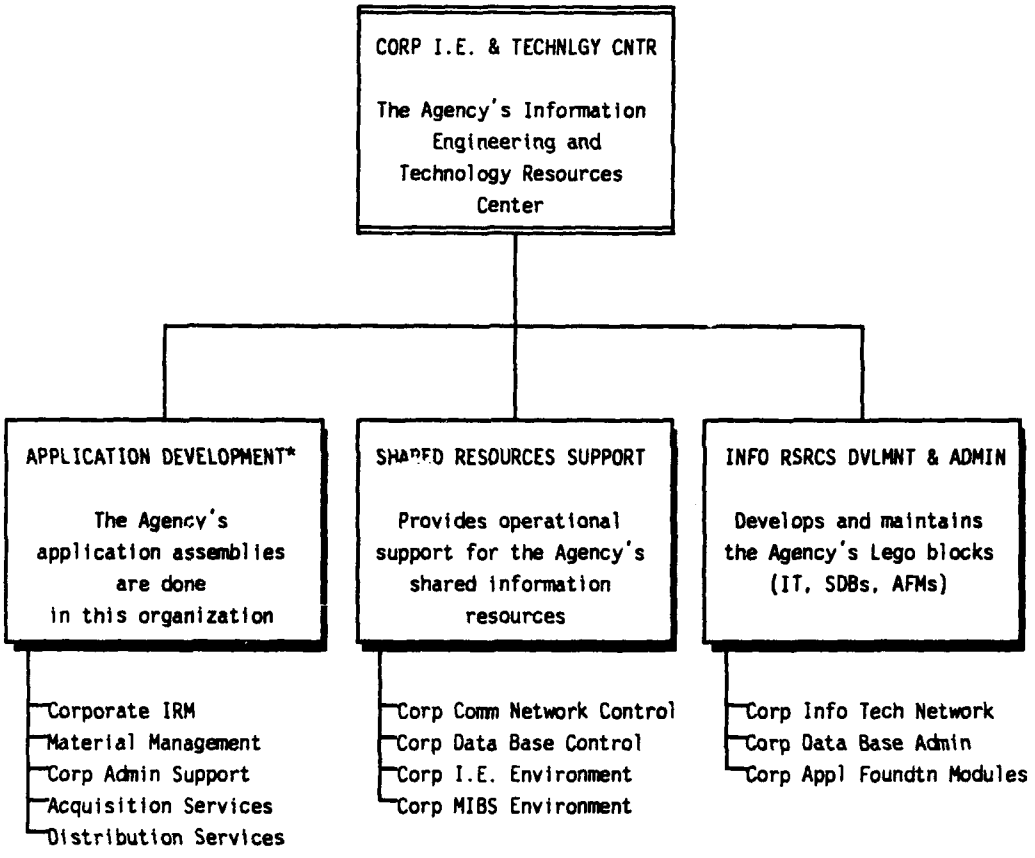


**It is likely that the STINFO applications will be operated by the Military District of Washington's IPC

Eventually the IPCs may take on a "Utility" appearance without a specific business area assignment.

ENCLOSURE 1

CORPORATE I.E. & TECHNOLOGY CENTER
ORGANIZATION STRUCTURE



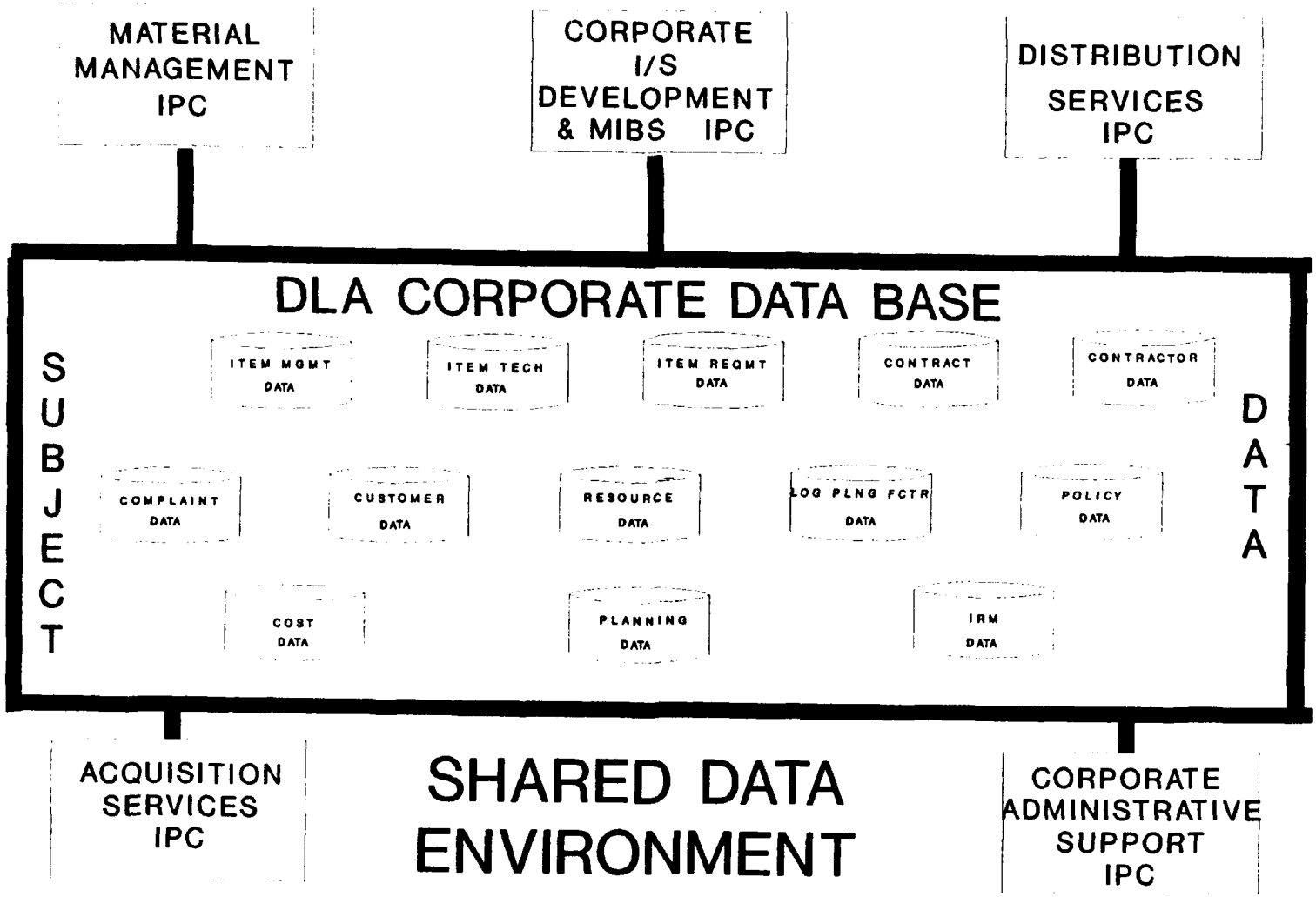
* This organization would be de-centralized to clusters of end-users. There is potential for eventual movemnt of appl devlmt responsibility to PSEs.

IT - Information Technology
SDB - Subject Data Base
AFM - Application Foundation Module

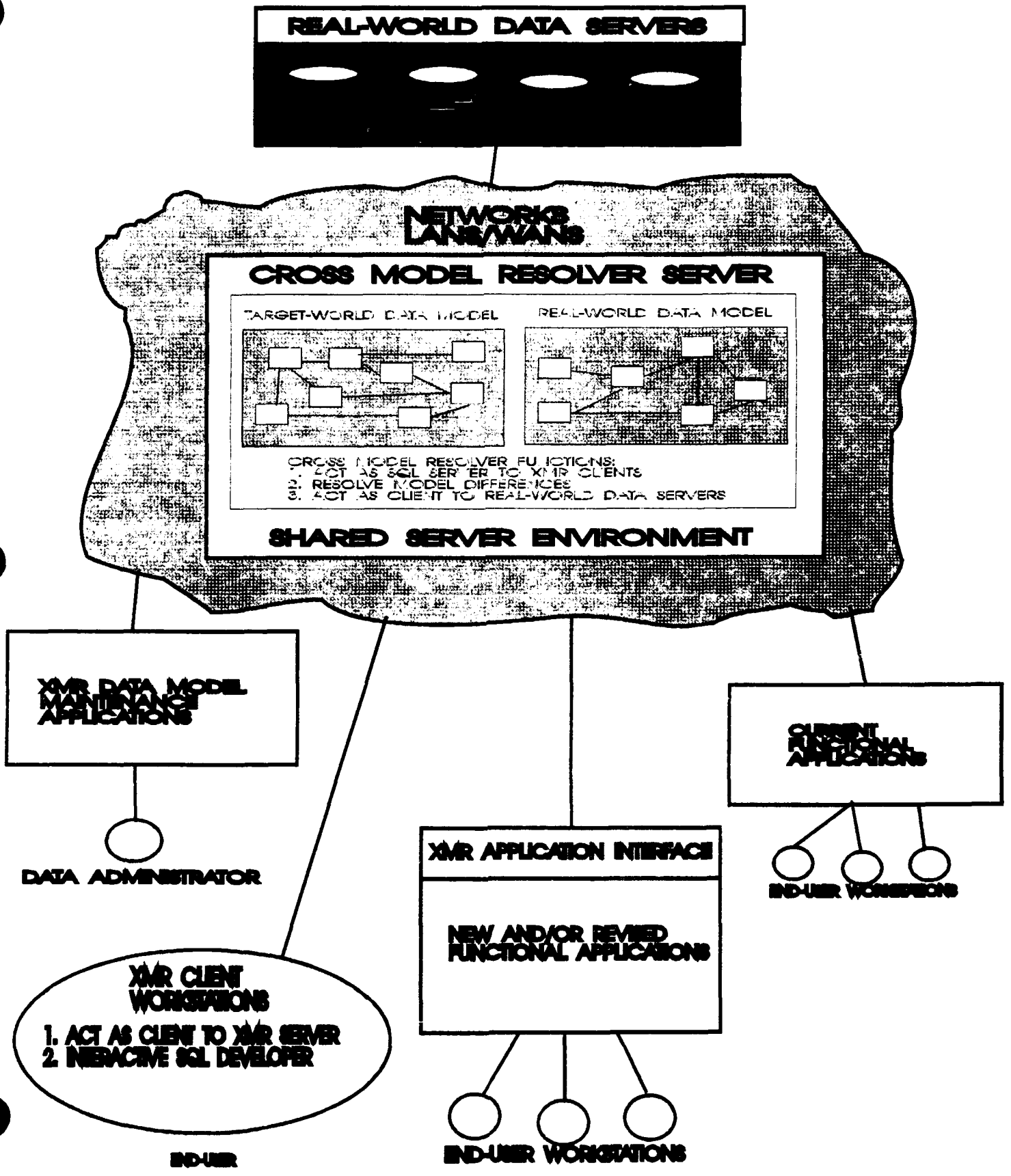
ENCLOSURE 2

ENCLOSURE 3

DLA INFORMATION PROCESSING CENTERS (IPCs)
CIRCA 2005 AD



CROSS MODEL RESOLVER (XMR)



ENCLOSURE 4

INFORMATION SYSTEMS ARCHITECTURE -- A FRAMEWORK

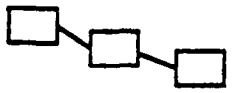
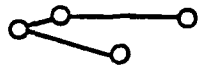
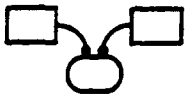
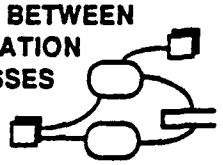
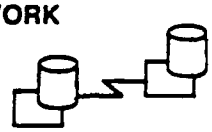
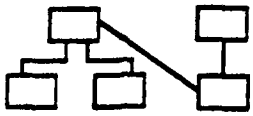
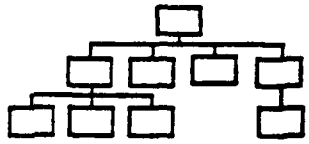
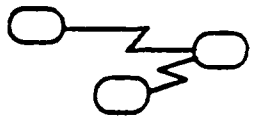
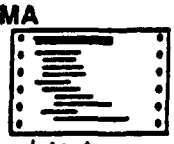
		DATA	PROCESS	NETWORK
1	BUSINESS SCOPE	LIST OF THINGS IMPORTANT TO THE BUSINESS  ENTITY: class of business things	LIST OF PROCESSES THE BUSINESS PERFORMS  PROCESS: class of business processes	LIST OF LOCATIONS IN WHICH THE BUSINESS OPERATES  NODE: business location
2	BUSINESS MODEL	BUSINESS ENTITIES & THEIR INTER-RELATIONSHIPS  ENTITY: business entity RELN.: business rule	FLOWS BETWEEN BUSINESS PROCESSES  PROCESS: business process I/O: business product / service	COMMUNICATIONS LINKS BETWEEN BUSINESS LOCATIONS  NODE: business unit group LINK: business connection
3	INFORMATION SYSTEMS MODEL	MODEL OF THE BUSINESS DATA & ITS INTER-RELATIONSHIPS  ENTITY: data entity RELN.: data relationship	FLOWS BETWEEN APPLICATION PROCESSES  PROCESS: application system I/O: user views (set of data elements)	DISTRIBUTION NETWORK  NODE: set of I/S functionality (processor, storage, etc.) LINK: line characteristics
4	TECHNOLOGY MODEL	DATABASE DESIGN  ENTITY: segment, row, recd. RELN.: pointer, key, index	SYSTEM DESIGN  PROCESS: computer process I/O: screen/device formats	CONFIGURATION DESIGN  NODE: hardware, system software LINK: line specifications
5	TECHNOLOGY DEFINITION	DATABASE SCHEMA & SUBSCHEMA DEFINITION  ENTITY: fields, data types RELN.: addresses, access methods	PROGRAM CODE & CONTROL BLOCKS  PROCESS: language statemts. I/O: control blocks	CONFIGURATION DEFINITION  NODE: addresses LINK: protocols
6	INFORMATION SYSTEM	DATA STORAGE STRUCTURES Databases, data,...	EXECUTABLE CODE Programs, common modules, ...	SYSTEM CONFIGURATION Host, network, switches, monitors,...
		A	B	C

Chart provided by John A. Zachman, IBM Corporation.

ENCLOSURE 5

INFORMATION SYSTEMS ARCHITECTURE -- A FRAMEWORK

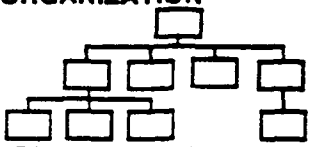
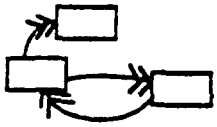
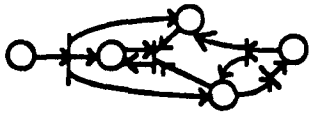
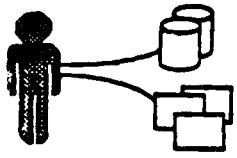
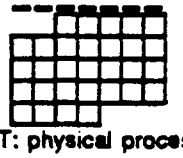
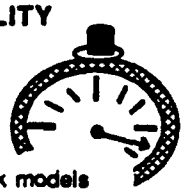
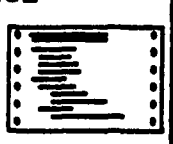
	ROLE	TIMING	MOTIVATION	
1	LIST OF BUSINESS RESPONSIBILITIES  RESP.: class of business responsibilities	LIST OF BUSINESS EVENTS  EVENT: class of significant business events	LIST OF BUSINESS GOALS  ENDS: mission / goals	BUSINESS SCOPE
2	BUSINESS ORGANIZATION  RESP.: work unit/structure WORK: business resource	BUSINESS CYCLES  EVENT: business event CYCLE: lapse / lag	BUSINESS STRATEGIES  ENDS: goals / mission MEANS: tactics/ plans	BUSINESS MODEL
3	MODEL OF ACCESS REQUIREMENTS  RESP.: system privilege WORK: access requirements	MODEL OF PROCESS CONTROL STRUCTURE  EVENT: logical process event CYCLE: precedence / timing	SERVICE SUPPORT ENVIRONMENT  ENDS: service level agreements MEANS: I/S plans & change tactics	INFORMATION SYSTEMS MODEL
4	ACCESS DESIGN  RESP.: access authorizations WORK: access group	PROCESSING ENVIRONMENT  EVENT: physical process event CYCLE: processing calendar	AVAILABILITY DESIGN  ENDS: benchmark models MEANS: availability windows & availability measures	TECHNOLOGY MODEL
5	ACCESS DEFINITION  RESP.: access object WORK: access profiles	JOB PROCESSING DEFINITION  EVENT: trans., job submittal CYCLE: job & region schedules	PERFORMANCE DEFINITION  ENDS: benchmark targets MEANS: benchmark testing, system monitoring / tuning	TECHNOLOGY DEFINITION
6	ACCESS PRIVILEGES User-ids, access controls, ...	PROCESSING SCHEDULES Batch jobs, transactions, run/rerun instructions, ...	SYSTEM MANAGEMENT FACILITIES Monitoring facilities, problem management, ...	INFORMATION SYSTEM
	D	E	F	

Chart provided by John A. Zachman, IBM Corporation.

ENCLOSURE 5

ENCLOSURE 6

- DATA ENTITIES FOR INFORMATION RESOURCE MANAGEMENT (WORKSHEET)

The ROUGH STRAWMAN DRAFT of entities listed here includes many potential sub-entities and attributes; this needs to be cleaned up to differentiate between entities and attributes and verified by DLA's IRM organizations. This list is only to be utilized as a starting point for discussion and determination of the official IRM entities. When resolved the list becomes the Business Scope of Data entry into the first layer of the Zachman Framework for I/S Architecture (See Enclosure 5).

- DLA BUSINESS REQUIREMENTS
  - *BUSINESS CONSTRAINT*
  - *BUSINESS CRITICAL SUCCESS FACTORS*
  - *BUSINESS ENTITIES*
  - *BUSINESS GOALS*
    - BUSINESS OBJECTIVES
      - *FUNCTIONAL OBJECTIVE*
        - SYSTEM
        - PROCESS
          - BUSINESS SUBJECT AREA
        - ACTIVITY
          - APPLICATIONS
        - TASK
      - *I/S OBJECTIVE*
        - DATA ENTITY
        - DATA RELATIONSHIP
          - DATA SUBJECT AREA
        - ATTRIBUTE
  - *BUSINESS MISSION*
  - *BUSINESS OPERATIONAL OBJECTIVE*
  - *BUSINESS PROCESSES*
  - *BUSINESS STRATEGIC OBJECTIVE*
    - TACTIC
    - PLAN
    - PROGRAM
  - *BUSINESS TACTICAL OBJECTIVE*
  - *BUSINESS UNIT GROUPS*
- DLA BUSINESS TRANSACTIONS
  - *CATALOG A NEW ITEM*
  - *ESTABLISH A NEW CONTRACT*
  - *EXCESS MATERIAL OFFER*
  - *MATERIAL RECEIPT*
  - *MATERIAL REQUISITION*
  - *NEW ITEM ASSIGNMENT*
  - *PAYMENT*
  - *PROVISIONING SCREENING*
  - *SHIPPING ORDER*
- IRM ADMINISTRATIVE ACTIVITY
  - *ASSIGNMENTS*
  - *EMPLOYEE AWARD/RECOGNITION*
  - *MEETINGS - (BRIEF, CLASS, CONFERENCE, SYMPOSIUM, ETC.)*

- TYPE MEETING
  - *Briefing*
  - *Class*
  - *Committee*
  - *Conference*
  - *Symposium*
- Agenda
- Briefing Charts
- *MISCELLANEOUS EVENTS*

IRM CORRESPONDENCE

- *ACQUISITION SOLICITATION*
  - IFB
  - RFP
- *INCIDENT REPORT*
- *IOM*
- *MFR*
- *ROUTING LIST*
- *WORK ORDER/WORK REQUEST*
  - SYSTEM CHANGE REQUEST
  - TASKING
  - TECHNOLOGY WORK REQUEST

IRM EXTERNAL INTERFACES

- *AUDITORS*
  - DAISRC
  - MAISRC
  - GSA
- *CLIENTS*
- *CONTRACTORS*
- *CORPORATE BUSINESS FUNCTIONAL PROPONENTS*
  - CORPORATE MANAGEMENT
    - *DLA DIRECTOR*
  - PRINCIPLE STAFF ELEMENTS
    - *STAKE HOLDERS*
- *END USERS*
- *SUPERIORS*
- *SUPPLIERS*
- *TECHNOLOGY USER GROUP*
- *VENDOR*

IRM PLANS

- *ACQUISITION*
- *ACTION*
  - AIS MASTER PROGRAM PLAN
    (Mentioned in IRM Plan page II-1)
    - *DEFICIENCIES*
      - FUNCTIONAL
      - CORPORATE SUPPORT
    - *INITIATIVES*
      - INITIATIVE PROGRAM MANAGER
- *BUDGET*
  - ANNUAL BUDGET
  - BUDGET LINE
  - POM
- *CAPACITY*
- *IRM*

ENCLOSURE 6

- NEAR-TERM
- LONG-TERM
- *PROGRAM*
  - PROGRAM MANAGER

- IRM POLICY AND REGULATION
  - *EXTERNAL*
    - CONSTRAINT
    - GUIDELINE
      - *DEFENSE MANAGEMENT REPORT DECISIONS (DMRDs)*
      - *DLA STRATEGIC PLAN*
      - *DOD CORPORATE INFORMATION MANAGEMENT (CIM)*
      - *DOD/DLA BUDGET GUIDANCE*
    - LEGISLATION
    - REGULATION
    - STANDARD
  - *INTERNAL*
    - ASSUMPTION
    - CONSTRAINT
    - CONVENTION
    - DIRECTIVES
    - GUIDES
      - *TECHNOLOGY INTEGRATION GUIDE*
    - HANDBOOKS
    - POLICY STATEMENT
    - PROCEDURES
    - REGULATIONS
    - STANDARD

- IRM PRODUCTS AND SERVICES
  - *OPERATIONS PERFORMANCE RATING*
  - *(See IBM mgng the data processing org page 66)*
    - WORKLOAD
    - UTILIZATION OF RESOURCES
    - COST
      - *SALARIES AND RELATED EXPENSES*
      - *OCCUPANCY AND RELATED EXPENSES*
      - *EQUIPMENT AND RELATED EXPENSES*
      - *COMMUNICATIONS AND RELATED EXPENSES*
      - *OPERATING SUPPLIES*
      - *OTHER OPERATING EXPENSES*
      - *ALLOCATED EXPENSES*
  - *REPORT*
    - DISPR
  - *USER SERVICE LEVEL AGREEMENT*
  - *USER SERVICE LEVEL RATING*
    - I/S RATING
    - USER RATING

- IRM PROJECTS
  - *IMPLEMENTATION*
    - NEW APPLICATIONS
    - APPLICATION CHANGES
  - *RESEARCH AND FEASIBILITY STUDIES*
    - TECHNICAL
    - FUNCTIONAL
    - ORGANIZATIONAL

ENCLOSURE 6

- METHODS AND PROCEDURES
- *STATUS REPORT*
- *PROGRAM*
  - PROJECTS
    - *EVENT*
    - *MILESTONE*
- *SCHEDULE*
- *TARGET DATE*

IRM REQUIREMENTS

- *I/S BUSINESS ENTITIES*
- *I/S CONSTRAINT*
- *I/S CRITICAL SUCCESS FACTORS*
- *I/S GOALS*
- *I/S MISSION*
- *I/S OPERATIONAL OBJECTIVE*
- *I/S PROCESSES*
  - CAPACITY MANAGEMENT
    - *CAPACITY PLANNING*
    - *PERFORMANCE ANALYSIS*
  - CONFIGURATION MANAGEMENT
  - DEVELOPMENT
  - END-USER SUPPORT
  - FINANCIAL MANAGEMENT
    - *BUDGETING*
    - *COST BENEFIT ANALYSIS*
  - OPERATION
  - PERSONNEL MANAGEMENT
  - POLICY DEVELOPMENT
  - PROJECT MANAGEMENT
  - REQUIREMENTS ANALYSIS
  - RESEARCH
  - REVIEW AND EVALUATION
  - STANDARDS AND PROCEDURES DEVELOPMENT
- *I/S STRATEGIC OBJECTIVE*
- *I/S TACTICAL OBJECTIVE*
- *I/S UNIT GROUPS*

IRM RESOURCES

- *APPLICATIONS (STANDARD AND UNIQUE)*
  - PROGRAM
  - MODULE
- *COMMUNICATIONS NETWORK*
  - WIDE-AREA
  - LOCAL-AREA
  - WORK-AREA
- *CONTRACT*
- *DATA*
  - DATA BASE
  - FILE
- *FACILITIES/ENVIRONMENT*
  - SITE
    - *AIR CONDITIONING*
    - *ELECTRICAL POWER*
    - *FURNISHINGS*
    - *PHYSICAL SPACE*

- *REFERENCE LIBRARY*
- *SUPPLIES*

HARDWARE/SOFTWARE

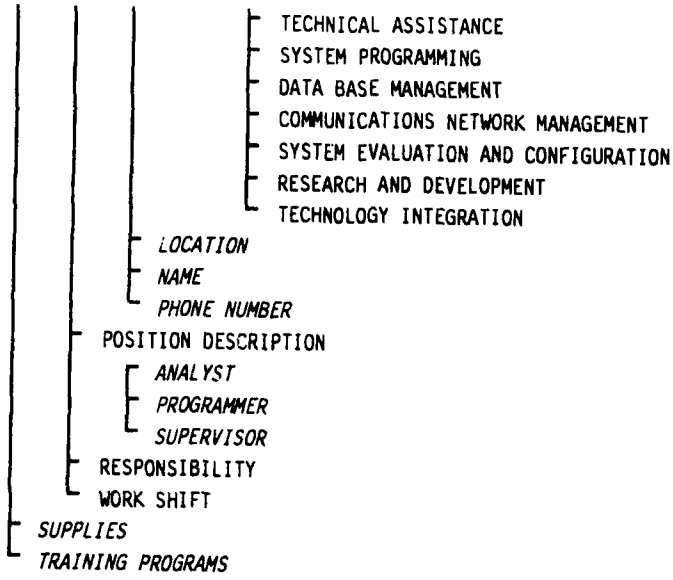
- COMPUTER
- CONFIGURATION
- DATA STORAGE
- ENVIRONMENTAL REQUIREMENT
  - *SPACE*
  - *POWER*
  - *AIR*
- MAINTENANCE REQUIREMENT
- NETWORK
- TECHNICAL SOFTWARE
  - *CASE TOOL*
  - *DBMS*
  - *NETWORK MANAGER*
  - *OPERATING SYSTEM*
  - *PROGRAMING LANGUAGE*
  - *TRANSACTION MANAGER*

MONEY

ORGANIZATION

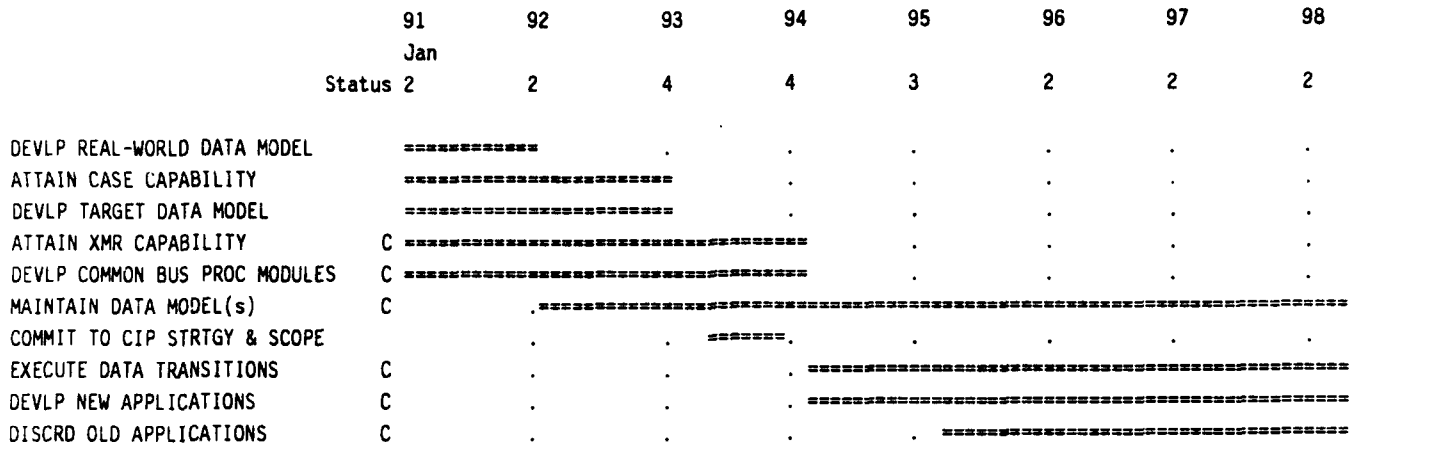
- FUNCTION
- INDIVIDUAL TRAINING PLAN
- KNOWLEDGE, SKILL, ABILITY REQUIREMENTS
- MISSION
- PERFORMANCE EVALUATION
- PERFORMANCE STANDARD
- PERSONNEL
  - *PERSONNEL TYPE*
    - 1 POLICY
    - 2 REQUIREMENT ANALYSIS
    - 3 DESIGN SPECIFICATION
    - 4 IMPLEMENTATION
      - APPLICATION DEVELOPMENT
        - ANALYSIS
        - DESIGN
        - PROGRAMMING
        - TEST
        - INSTALLATION
        - MAINTENANCE
        - POST INSTALLATION EVALUATION
    - 5 OPERATION
      - SCHEDULING AND CONTROL
      - EQUIPMENT OPERATIONS
      - PRODUCTION SUPPORT
    - 6 MANAGEMENT
      - PLANS AND CONTROLS
      - PERSONNEL AND TRAINING
      - FINANCIAL MANAGEMENT
      - ADMINISTRATIVE SERVICES
      - USER LIAISON
      - SECURITY
    - 7 TECHNICAL SUPPORT/INTEGRATION
      - STANDARDS

ENCLOSURE 6


TECHNICAL ASSISTANCE
SYSTEM PROGRAMMING
DATA BASE MANAGEMENT
COMMUNICATIONS NETWORK MANAGEMENT
SYSTEM EVALUATION AND CONFIGURATION
RESEARCH AND DEVELOPMENT
TECHNOLOGY INTEGRATION
LOCATION
NAME
PHONE NUMBER
POSITION DESCRIPTION
ANALYST
PROGRAMMER
SUPERVISOR
RESPONSIBILITY
WORK SHIFT
SUPPLIES
TRAINING PROGRAMS

ENCLOSURE 6

Schedule Name: CHANGE IN-PLACE EXECUTIVE LEVEL IMPLEMENTATION STRATEGY
Project Manager: DLA
As of date: 28-Nov-90 12:52pm Schedule File: E:\TL\TLDATA\CIPPLAN



D Done === Task - Slack time (==---), or
C Critical +++ Started task Resource delay (---==)
R Resource conflict M Milestone > Conflict
p Partial dependency
Scale: Each character equals 1 month

TIME LINE Gantt Chart Report Strip 1

ENCLOSURE 7

1. CHANGE IN-PLACE IMPLEMENTATION STRATEGY
   1.1. REQUIREMENTS COMMON TO ALL SCENARIOS
      1.1.1. *ATTAIN COMPUTER ASSISTED SYSTEMS ENGINEERING CAPABILITY*
         1.1.1.1. *The CASE environment must provide for information engineering covering the entire spectrum from Business Area Analysis through non-technology specific code generation.*
      1.1.2. *DEVELOP COMMON BUSINESS PROCESS FOUNDATION MODULES*
         1.1.2.1. *Common low-level business process modules that may be assembled (with the addition of application unique outer shell logic) into applications should be identified and developed.*
   1.2. THE CHANGE IN-PLACE ALTERNATIVE SCENARIO CHANGES THE IRM ENVIRONMENT THROUGH A GRADUAL RE-ENGINEERING OF DATA AND PROCESSES UNTIL THE ENTIRE TRANSITION IS COMPLETED. SINCE OLD AND NEW SYSTEMS WOULD CO-EXIST AND INTER-OPERATE THIS ALTERNATIVE WOULD MAKE EXTENSIVE USE OF CROSS MODEL RESOLUTION.
      1.2.1. *ATTAIN CROSS MODEL RESOLUTION CAPABILITY.*
         1.2.1.1. *Acquire or develop the capability to viably perform cross model resolution.*
      1.2.2. *COMMIT TO CHANGE IN-PLACE STRATEGY AND DATA SCOPE.*
         1.2.2.1. *Determine Corporate Data Scope Alternatives.*
            1.2.2.1.1. *Consider:*
               1.2.2.1.1.1. *DLA-Wide.*
                  1.2.2.1.1.1.1. *Combines the data needs of the DLA into one logical data model.*
               1.2.2.1.1.2. *Major DLA Thrust Area Wide.*
                  1.2.2.1.1.2.1. *Creates logical data models for each major thrust area defined in the CFR and/or Strategic Objectives. Implies redundancies across thrust areas.*
               1.2.2.1.1.3. *Current Application Wide.*
                  1.2.2.1.1.3.1. *Logical data models would be developed for each of DLA's current application areas with no change in scope. Implies redundancies across each application area; e.g. SAMMS, DWASP, DIDS, MOCAS, etc.*
               1.2.2.1.1.4. *DoD-Wide.*
                  1.2.2.1.1.4.1. *Combines the data needs of the DoD into one logical data model. This decision would put the execution beyond the scope of DLA's authority.*
         1.2.2.2. *Gain Agency-Wide commitment to the Change In-Place strategy and data scope.*
            1.2.2.2.1. *Train appropriate personnel on concepts.*
      1.2.3. *DEVELOP TARGET DATA MODEL.*
         1.2.3.1. *Develop detailed target data models using appropriate information engineering methodologies.*
         1.2.3.2. *Attain Agency commitment to target data models.*
      1.2.4. *DEVELOP REAL-WORLD DATA MODEL.*
         1.2.4.1. *Develop data models of existing data environments.*
      1.2.5. *DEVELOP NEW APPLICATIONS.*
         1.2.5.1. *Develop new applications using appropriate information engineering methodologies.*
         1.2.5.2. *The new applications would utilize the target data models.*
            1.2.5.2.1. *The cross model resolver would resolve differences between real-world data models and target models until they become identical through data transition efforts.*
      1.2.6. *EXECUTE DATA TRANSITIONS.*
         1.2.6.1. *Determine sequence of data transitions.*
            1.2.6.1.1. *Consider:*
               1.2.6.1.1.1. *Performance needs.*
                  1.2.6.1.1.1.1. *Where the data in the current systems is very inefficient to access in the target model view.*
               1.2.6.1.1.2. *Removal of old data bases.*
                  1.2.6.1.1.2.1. *When possible move data out of entire old data bases so that they may be removed as early as possible.*

ENCLOSURE 7

1.2.6.2. *Attain Agency commitment to data transition sequence.*

1.2.6.3. *Execute data transitions.*

1.2.7. *DISCARD OLD APPLICATIONS.*

1.2.7.1. *Old applications may be discarded as soon as the functionality in them is replaced by new functionality in the newly engineered applications.*

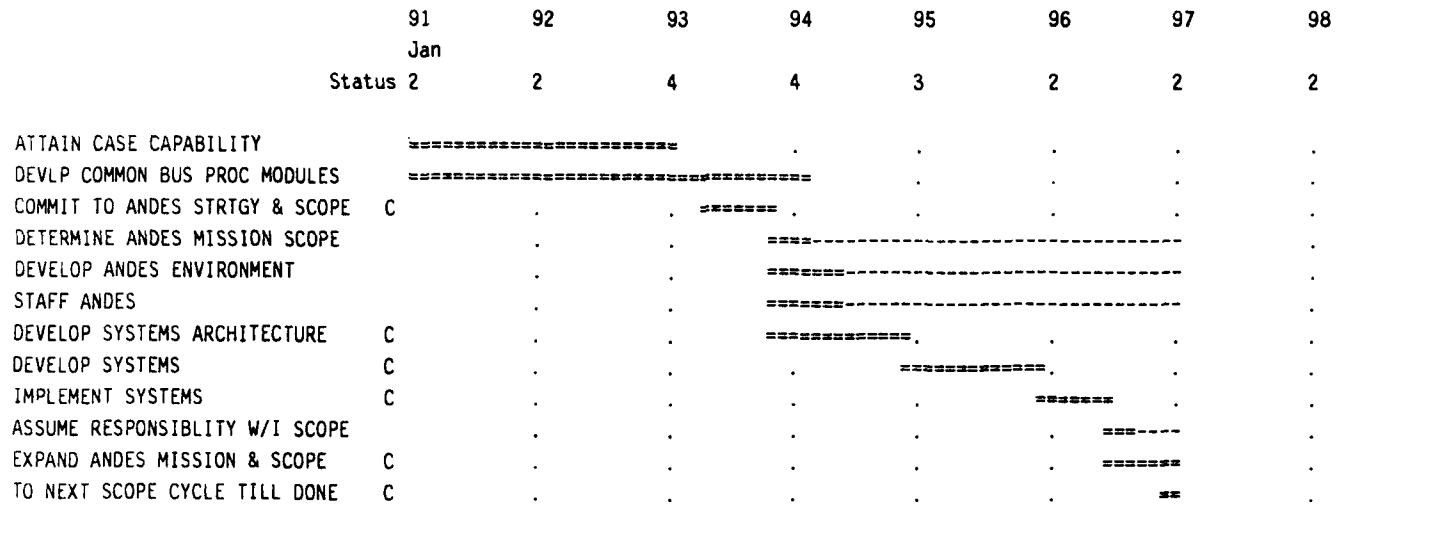
1.2.8. *MAINTAIN DATA MODEL(s).*

1.2.8.1. *As each data transition from real-world data bases/files to target data bases occurs the real-world and target data models must be updated.*

1.2.8.2. *When the real-world and target data models are identical the data transition is complete.*

ENCLOSURE 7

Schedule Name: ANDES EXECUTIVE LEVEL IMPLEMENTATION STRATEGY
Project Manager: DLA
As of date: 28-Nov-90 12:54pm Schedule File: E:\TL\TLDATA\ANDESPLN



D Done === Task - Slack time (==---), or
C Critical +++ Started task Resource delay (---==)
R Resource conflict M Milestone > Conflict
p Partial dependency
Scale: Each character equals 1 month

TIME LINE Gantt Chart Report Strip 1

ENCLOSURE 8

1. A NEW DLA ENVIRONMENT SEED (ANDES) IMPLEMENTATION STRATEGY
   1.1. REQUIREMENTS COMMON TO ALL SCENARIOS
      1.1.1. *ATTAIN COMPUTER ASSISTED SYSTEMS ENGINEERING CAPABILITY*
         1.1.1.1. *The CASE environment must provide for information engineering covering the entire spectrum from Business Area Analysis through non-technology specific code generation.*
      1.1.2. *DEVELOP COMMON BUSINESS PROCESS FOUNDATION MODULES*
         1.1.2.1. *Common low-level business process modules that may be assembled (with the addition of application unique outer shell logic) into applications should be identified and developed.*
   1.2. THE ANDES ALTERNATIVE SCENARIO CREATES A NEW ENVIRONMENT BEYOND THE EXISTING DLA ENVIRONMENT. DLA MISSION FUNCTIONS WOULD GRADUALLY BE TRANSFERRED TO THE NEW ENVIRONMENT AS IT GROWS IN CAPABILITY TO ACCEPT THEM. THIS ALTERNATIVE DOES NOT REQUIRE INTEGRATION OF THE OLD AND NEW ENVIRONMENTS AND DOES NOT REQUIRE CONVERSION OF LEGACY APPLICATIONS.
      1.2.1. *COMMIT TO ANDES STRATEGY AND DATA SCOPE.*
         1.2.1.1. *Determine Corporate Data Scope Alternatives.*
            1.2.1.1.1. *Consider:*
               1.2.1.1.1.1. *DLA-Wide.*
                  1.2.1.1.1.1.1. *Combines the data needs of the DLA into one logical data model.*
               1.2.1.1.1.2. *Major DLA Thrust Area Wide.*
                  1.2.1.1.1.2.1. *Creates logical data models for each major thrust area defined in the CFR and/or Strategic Objectives. Implies redundancies across thrust areas.*
               1.2.1.1.1.3. *DoD-Wide.*
                  1.2.1.1.1.3.1. *Combines the data needs of the DoD into one logical data model. This decision would put the execution beyond the scope of DLA's authority.*
         1.2.1.2. *Gain Agency-Wide commitment to the ANDES strategy and data scope.*
            1.2.1.2.1. *Train appropriate personnel on concepts.*
      1.2.2. *DETERMINE INITIAL ANDES MISSION SCOPE*
         1.2.2.1. *Establish Small Core ANDES Planning Team*
         1.2.2.2. *Decide on Implementation Strategy*
            Centralized
            Decentralized
            Distributed
            Regionalized (Assumed in rest of paper)
               . *Functionally (Assumed)*
               . *Geographically*
         1.2.2.3. *Determine Federal Stock Classes for ANDES Management*
            1.2.2.3.1. *Select Class(s) that fit in Current Region*
               1.2.2.3.1.1. *Preferably a straight-forward Class(s) with a total of a few hundred items at the most.*
      1.2.3. *STAFF ANDES (This step repeated for each mission scope increase)*
         1.2.3.1. *Design Organization Structure*
            1.2.3.1.1. *Assign Specific Responsibilities*
            1.2.3.1.2. *Assign Specific Authorities.*
         1.2.3.2. *Determine Staffing Types and Levels*
            1.2.3.2.1. *Information Systems Personnel*
            1.2.3.2.2. *Functional Personnel*
            1.2.3.2.3. *Contractor Personnel*
         1.2.3.3. *Determine Location of Staff*
            1.2.3.3.1. *Determine which staff will be located at ANDES site versus at current sites with ANDES access.*
      1.2.4. *DEVELOP ANDES ENVIRONMENT*
         1.2.4.1. *Install Information Systems Environment*
            1.2.4.1.1. *Determine ANDES I/S Sizing*

ENCLOSURE 8

1.2.4.1.2. *Acquire Hardware/Software*

1.2.4.2. *Install Functional Environment*

1.2.4.2.1. *Make new functional operational decisions such as Just-in-Time Inventory versus large inventories etc. Determine facilities necessary. Share facilities with existing DLA only as appropriate such as: Bases, Buildings, Furniture and supplies, etc.*

1.2.5. *DEVELOP SYSTEMS ARCHITECTURE*

1.2.5.1. *Develop Data Architecture*

1.2.5.2. *Develop Applications Architecture*

1.2.6. *DEVELOP SYSTEMS*

1.2.6.1. *Develop Subject Data Bases at Decided Scope*

1.2.6.2. *Develop Applications necessary for ANDES Scope*

1.2.6.2.1. *CASE tools with 4th/5th generation technologies will be utilized. Development will occur via User/Developer teams. Performance requirements will be specified prior to development. If performance objectives are not met the application will be rewritten in a procedural language else it will be left in the 4GL. Either standard procedural or easily rewritten 4GLs will be considered as satisfying program portability objectives.*

1.2.7. *IMPLEMENT SYSTEMS*

1.2.7.1. *Train Users*

1.2.7.2. *Transfer Production Data Within Scope From DLA Files*

1.2.7.3. *Turn New System(s) on*

1.2.8. *ASSUME RESPONSIBILITY WITHIN SCOPE*

1.2.8.1. *Transfer Management Responsibility from DLA*

1.2.8.2. *Determine Whether All Responsibilities Achieved*

If all regions are completed the Transition is Complete.

1.2.9. *EXPAND ANDES MISSION SCOPE ->Loop to-> STAFF ANDES*

1.2.9.1. *Select Next Region If Current Complete*

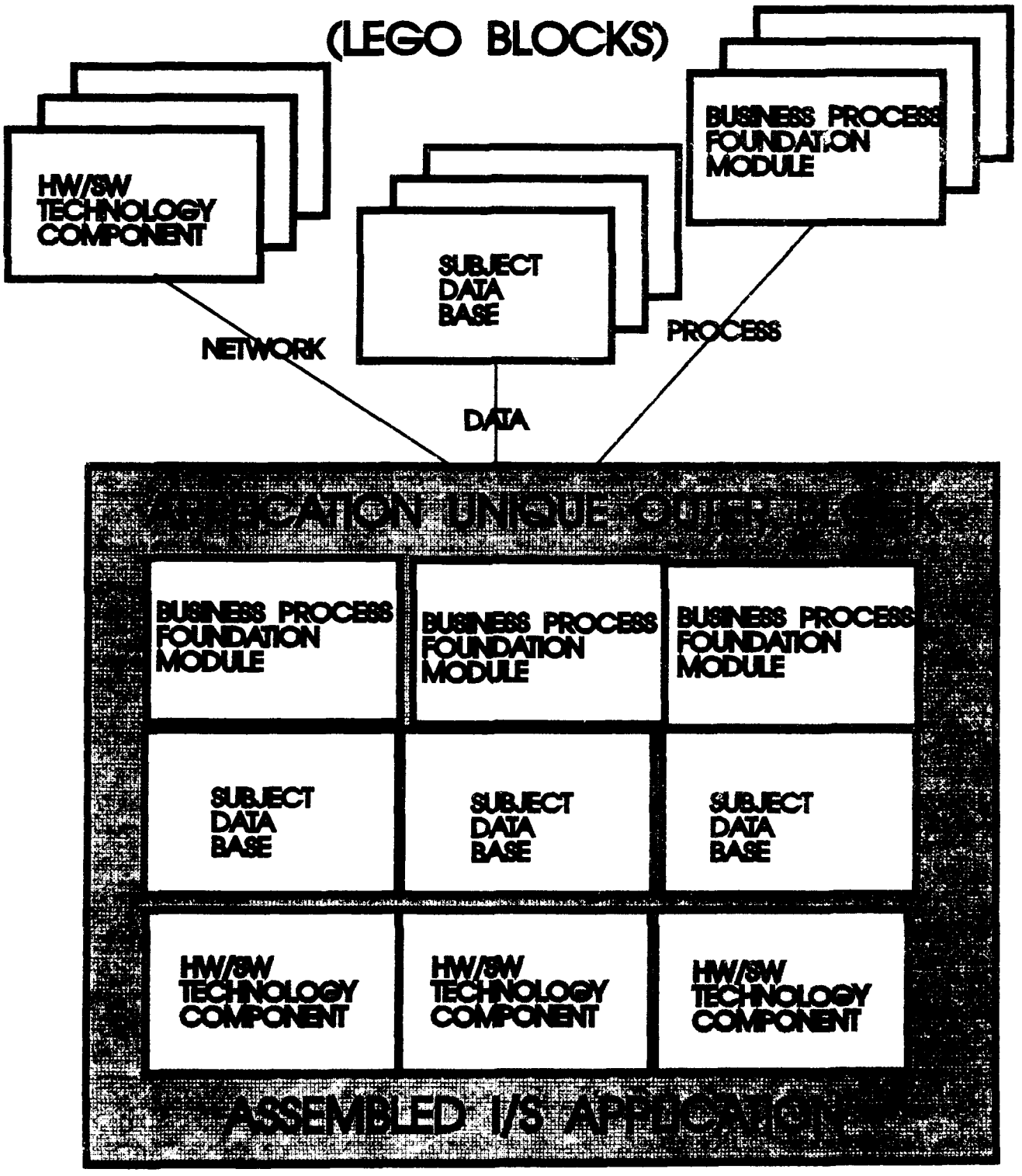
1.2.9.2. *Determine Additional Mission Scope for ANDES Management*

1.2.9.2.1. *FSCs for ANDES Management*

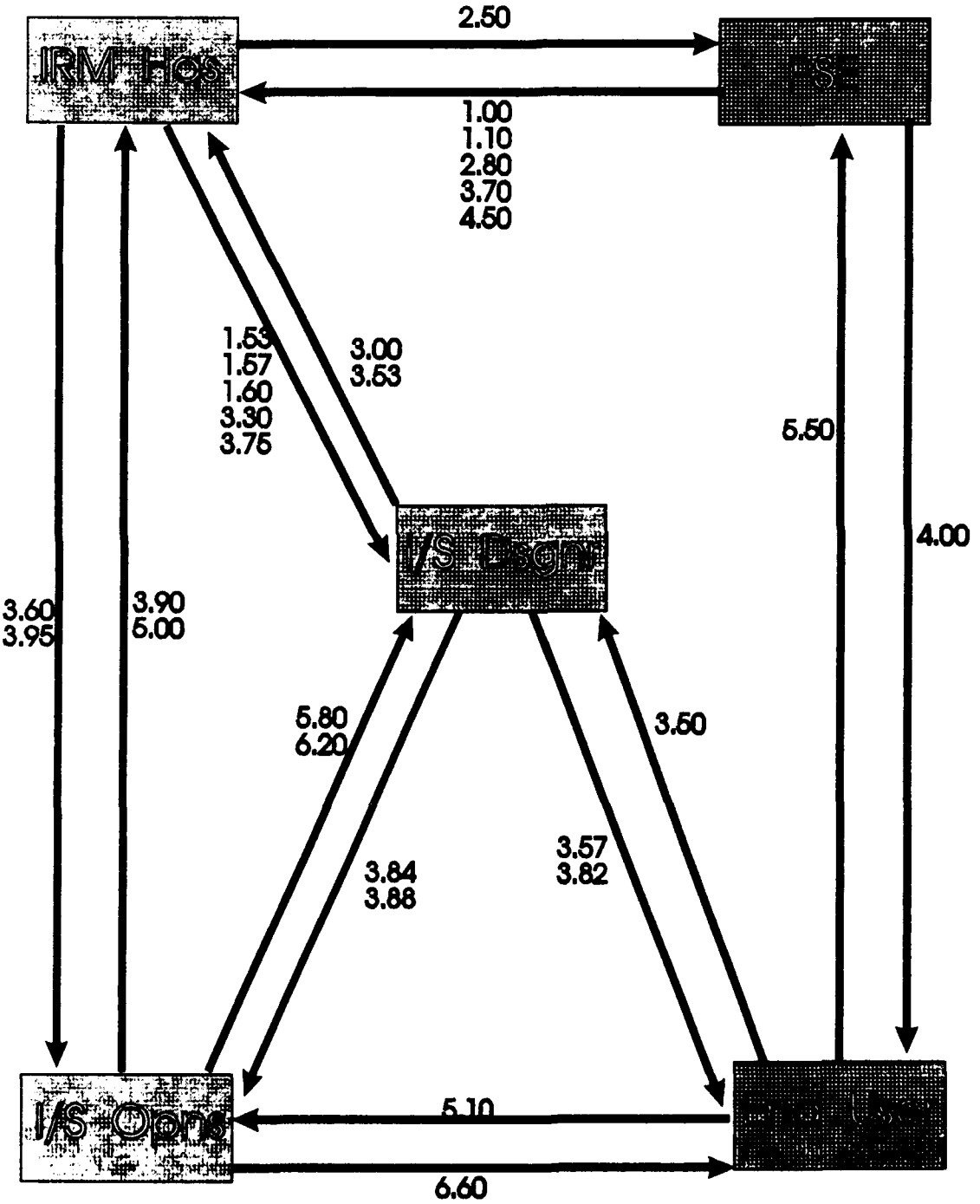
1.2.9.2.2. *Contract Types for ANDES Management*

ENCLOSURE 8

INFORMATION SYSTEMS ARCHITECTURE COMPONENTS (LEGO BLOCKS)



CRITICAL INFORMATION FLOWS



ENCLOSURE 10

INFORMATION INTERFACE REQUIREMENTS BETWEEN
IRM ORGANIZATIONAL ELEMENTS, PSEs AND END-USERS

(Depicts only critical information flows - Not end products)
(Does not include the information interfaces between PSE and End-User)

ORGANIZATIONAL SOURCE OF INFORMATION	SPECIFIC INFORMATION THAT IS PASSED	INFORMATION RECEIVING ORGANIZATION
0 PSE	1.00 Functional Requirement	IRM Hqs
0 PSE	1.10 Benefit Estimate	IRM Hqs
0 PSE	2.80 Prelim Automatn Decision	IRM Hqs
0 PSE	3.70 Implementation Decision	IRM Hqs
0 PSE	4.00 Operational Guidance	End User
0 PSE	4.50 I/S Services Evaluation	IRM Hqs
1 IRM Hqs	1.53 Automation Requirement	IRM Design Element
1 IRM Hqs	1.57 Benefit Margin Goal	IRM Design Element
1 IRM Hqs	1.60 Sys Arch/Intgrtn Guidnce	IRM Design Element
1 IRM Hqs	2.50 Initial Auto Cost Est	PSE
1 IRM Hqs	3.30 Automation Order	IRM Design Element
1 IRM Hqs	3.60 Budget Limits	IRM Oper Element
1 IRM Hqs	3.75 I/S Resource Approval	IRM Design Element
1 IRM Hqs	3.95 I/S Resource Approval	IRM Oper Element
2 IRM Design Element	3.00 Detailed Auto Cost Est	IRM Hqs
2 IRM Design Element	3.53 I/S Resource Requirments	IRM Hqs
2 IRM Design Element	3.57 User Interface Prototype	End User
2 IRM Design Element	3.82 End User Guide	End User
2 IRM Design Element	3.84 I/S Help	IRM Oper Element
2 IRM Design Element	3.88 I/S Operations Guide	IRM Oper Element
3 IRM Operations Elem	3.90 Operations Reports	IRM Hqs
3 IRM Operations Elem	5.00 I/S Resource Requiremnts	IRM Hqs
3 IRM Operations Elem	5.80 I/S Help Requests	IRM Design Element
3 IRM Operations Elem	6.20 I/S Performance Reports	IRM Design Element
3 IRM Operations Elem	6.60 I/S User Help	End User
4 End User	3.50 Detailed End user Reqs	IRM Design Element
4 End User	5.10 I/S User Help Request	IRM Oper Element

CRITICAL INFORMATION FLOWS

The numbering scheme used here generally reflects, although imprecisely, the sequence in which the various information interfaces will occur.

1.00 FUNCTIONAL REQUIREMENT

This is the initial passing of the business functional requirement from the PSE to IRM Hqs. As in all cases to follow, this information will be passed by way of the Corporate Enterprise Model Repository (referred to simply as the repository from here on). The metadata detail would correspond to the Business Scope level of Zachman's framework.

1.10 BENEFIT ESTIMATE

This is the PSE's estimate of benefits to DLA if the functional requirement is automated. This gives the IRM Hqs some idea on what automation solution alternatives may be cost/effective.

1.53 AUTOMATION REQUIREMENT

This is the PSE's business requirement after having been information engineered to the next level of detail. The metadata detail would correspond to the Business Model level of Zachman's framework.

1.57 BENEFIT MARGIN GOAL

This is the specific margin of benefits over cost to be achieved by the automation of this functional requirement. This margin will be passed along with the automation requirement to the IRM Design Element as a specific limit on the costs of the automated system to be developed. The margin would normally be a percentage standard (such as 10%) but would be individually set by negotiation between the Hqs IRM and the PSE.

1.60 SYSTEMS ARCHITECTURE/INTEGRATION GUIDANCE

This is the guidance provided by the IRM Hqs to the Design Element on standards to follow, information technology components that are available to the Agency, etc. This information would be passed as necessary in the form of official IRM Plans, Technology Plans, Technology Integration Guide, etc.

CRITICAL INFORMATION FLOWS

2.50 INITIAL AUTOMATION COST ESTIMATE
This is the first blush gross cost estimate developed by the IRM Hqs so that the PSE may be provide the opportunity to adjust the functional requirement or let it stand.

2.80 PRELIMINARY AUTOMATION DECISION
This is the decision to go ahead with a more detailed cost estimate after receiving the initial cost estimate.

3.00 DETAILED AUTOMATION COST ESTIMATE
This is the detailed cost estimate developed by the IRM Design Element. The detail of this estimate must be adequate enough for the PSE to make a determination as to whether or not to automate (at least with that design element). The PSE should be able to evaluate expected charge-back costs to benefits expected.

3.30 AUTOMATION ORDER
This is the order to begin design and implementation of the automated system after having assessed that the system will be cost/effective.

3.50 DETAILED END USER REQUIREMENTS
These are the detailed end-user requirements that are determined through integrated designer/end-user development teams. These requirements would generally take the shape of screen formats, help screen analysis, expert system advisory add-ons, etc. They establish, within the context of the original requirement, the specific user interfaces that are acceptable.

3.53 I/S RESOURCE REQUIREMENTS
These are the specific information technology (IT) and I/S personnel resource requirements necessary to implement the automated system.

3.57 USER INTERFACE PROTOTYPE
This is a prototype of the user interface to the automated system that is developed through integrated designer/end-user development teams. This interface would generally take the shape of screen formats, help screen analysis, expert system advisory add-ons, etc.

CRITICAL INFORMATION FLOWS

3.60 BUDGET LIMITS

These are specific cost limits for the operation of an automated system. The costs would be associated with units of work, e.g. cost per requisition, cost per contract modification, cost per paycheck, etc. so that the IRM Operating Element can budget his overall expenses. These budget limitations would be utilized as one of the prime factors (along with user satisfaction level reports) in rating the effectiveness level of an IPC.

3.70 IMPLEMENTATION DECISION

This is the order to go ahead with the development of the automated system. The PSE would make this decision based upon all cost/benefit assessments received.

3.75 I/S RESOURCE APPROVAL

This is the approval for expenditures of resources for development of the automated system.

3.82 END USER GUIDE

This is the manuals, on-line screens, computer assisted training devices, etc. that are provided to the end-user of the automated system for help in using the system.

3.84 I/S HELP

This is any help necessary in operating/using the automated system.

3.88 I/S OPERATIONS GUIDE

This is the manuals, on-line screens, computer assisted training devices, data base backup facilities, diagnostics, etc. that are provided to the IRM Operating Element for use in operating the automated system. The IRM Operating Element responsibilities may be delegated to the end-user for IT distributed to the user's environment.

3.90 OPERATIONS REPORTS

These are operations reports that describe the effectiveness levels of the operational environment, e.g. transactions processed, equipment and software failures, hours on-line, abnormalities, user complaints, resource utilization levels, etc.

3.95 I/S RESOURCE APPROVAL

This is the approval for expenditures of resources for the operation of the automated

system.

4.00 OPERATIONAL GUIDANCE

This is the guidance provided by the functional proponent (PSE) to the end-users of the automated system. This guidance would consist of business policies on the use of the system, eg. under what circumstances you would not authorize a purchase from a supplier, when to re-order material, when to refuse a loan, etc. Of course; most of these business policies will be built into the system generally by integrated expert systems.

4.50 I/S SERVICES EVALUATION

This is the scorecard of overall satisfaction of the information system in terms of performance and cost. Based upon this appraisal the IRM Hqs may make system repairs and service improvements or possibility alter the charge-back criteria. Hopefully all that would need to be done would to be to issue awards to the organizations/personnel responsible for a well designed/well operated system.

5.00 I/S RESOURCE REQUIREMENTS

These are the specific information technology (IT) and I/S personnel resource requirements necessary to operate the automated system.

5.10 I/S USER HELP REQUEST

These are requests for help in using the automated system.

5.80 I/S HELP REQUESTS

These are requests for help in determining and fixing problems beyond the scope or ability of the IRM Operations element.

6.20 I/S PERFORMANCE REPORTS

These are operations reports that describe the effectiveness levels, accuracy, usability, data integrity, software failures, operability, customer complaints, etc. of the information system. The purpose of these reports will be to provide information necessary for the designer to improve the performance, cost/effectiveness, and user satisfaction levels of the system.

6.60 I/S USER HELP

This is the actual help that is provided to the end-user by whatever form is necessary.

CONSIDERATIONS for ISS (Interim Standard System) IMPLEMENTATIONS

OBJECTIVE OF THESE NOTES

These notes identify specific ISS implementation planning considerations that must be researched and analyzed to minimize any negative impacts on the Services. They identify considerations that are a direct part of the ISS as well as corollary and residue implications on other parts of the Service's information systems.

CURRENT AIS ENVIRONMENTS

The Service's current automated information systems (AISs) operate within a variety of technology environments (Hardware and software). Most of these are IBM 370 and other vendor proprietary main-frame architected, which include an assortment of architecture dependent data base management and telecommunications environments. Complicating the issue; a wide-array of operational support systems for scheduling, capacity management and direct access storage space management are being utilized. These environments are not "open"; the applications which operate within them are heavily dependent upon existing vendor proprietary architecture environments to work properly. To be fair; any vendor dependent environment is contrary to DoD's open systems goals; not just IBM's.

CONSIDERATIONS IN COMBINING ENVIRONMENTS

The CIM concept of adopting interim standard systems (best-of-breeds) to be utilized by all the Services, although achievable, could prove to be difficult to implement. For example, the Material Management systems of each of the Services no doubt reflect organizational/procedural/cultural/policy differences of the Services. These differences will manifest themselves in many ways throughout the overall information resources management environment. Although implementation difficulties may be minimized through extensive planning and resource application, incompatibilities in the various aspects of overall information systems architecture frameworks[1], should be expected.

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[1]The framework discussed in this paper corresponds with the framework prescribed by John A. Zachman's Information Systems Architecture Framework.

CONSIDERATIONS for ISS (Interim Standard System) IMPLEMENTATIONS

The following areas must be analyzed and appropriate planning accomplished in order to minimize any negative effects of incompatibilities:

Data

DATA BASE ALIGNMENTS

The various data bases of the Services are not likely to contain data in support of identical process/function ranges. In other words - each Service's definition of Material Management may overlap more-or-less into other business areas such as Distribution, Item Identification, Re-Utilization, Contracting, etc. The inevitable mis-alignment of data will make it difficult to eliminate data bases of the losing Services if their data bases contain data supporting functions not covered in the chosen service's application.

DATA ATTRIBUTE DEFINITIONS

There is no guarantee that the Services use standard data attribute (data element) names, sizes, or value ranges. The mis-matching could be complicated many times over by Service unique data uses that may not have standard names. For example; a "Date" attribute may have a wide range of data uses to include, date of entry, completion date, order date, delivery date, etc. Although the apparent characteristics of each date appear the same, their meanings are entirely different.

Process

PROCESS ALIGNMENTS

The probability of the processes within each Service's business areas aligning 100% is very low. This is because there is not necessarily a discrete modular alignment of processes to business areas. This means that when the interim standard system (ISS) is selected or assembled that a lowest common denominator of functionality may leave the Services with residue processes that would still need to be accomplished outside of the ISS. On the other hand, a combined level of functionality approach would almost certainly include functions that, in the other Services, are out of that particular business area's

scope. This would require the Services to remove that functionality from the corollary processes that would otherwise be redundant.

Technology

POSTPONEMENT OF OPEN SYSTEMS IDEALS
Virtually all candidates for ISSs currently require IBM MVS operating environments. Multi-Service sharing and consolidation of any of these systems simply require larger technology environments of the same genre. Although yielding large economic advantages it does not contribute towards DoD's open systems objectives.

INABILITY TO QUIT OLD SYSTEMS
Data and process mis-alignments will temper the maximum benefits to be gained through consolidations if any or all of the Services must retain old systems or develop new corollary systems to operate residue processes and data that were not accommodated in the ISSs.

AN INDIRECT ROUTE TO OPEN SYSTEMS
If the decision remains unchanged to utilize existing IBM architectured environments for the interim standard systems there is a devious route to attaining open systems. This route requires the full adoption of the IBM environment to include fully embracing IBM's Systems Application Architecture (SAA) and AD/Cycle Repository information engineering environment. Since IBM has officially announced the Corporate objective of inter-operability between their SAA and AIX (IBM'S UNIX) environments it would be possible to approach the standard POSIX based open systems environment through IBM. This would be accomplished through the use of AD/Cycle to accomplish the re-engineering and the use of IBM's Cross Systems Product (CSP) to generate code for either the SAA or AIX worlds. Since AIX and POSIX are both UNIX based we will have achieved the opportunity to migrate, at will, to POSIX open systems or remain in the IBM SAA open environment.

Role

CONSIDERATIONS for ISS (Interim Standard System) IMPLEMENTATIONS

The primary effect of role changes within the Services is cultural. Cultural changes could be tenaciously difficult to effect. The very nature of Interim Standard Systems implies that future changes must be made when final standard systems are eventually developed. Direct moves by DoD towards the final systems in the first phase could lessen the effect of subsequent phases.

Timing

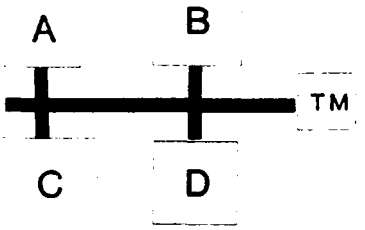
Changes to the Service's business events and cycles (cut-off dates, accounting periods, batch cycles, external interfaces, etc.) will require changes to its processing schedules.

Motivation

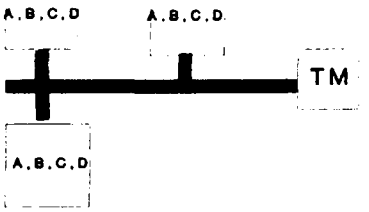
Shared ISSs will require the development of common business goals, strategies, and performance criteria.

DISTRIBUTED PROCESSING ALTERNATIVES

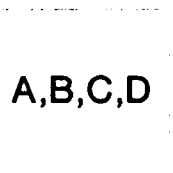
Application consists of functions A, B, C and D



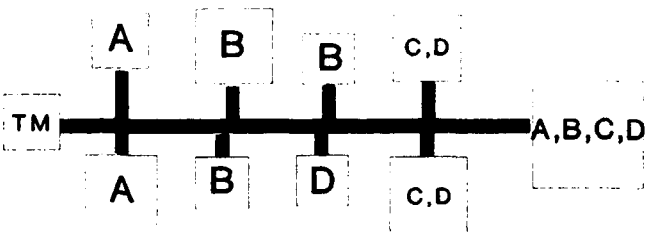
Distributed Transaction



Workload Balancing



Host Based



Hybrid (D/T with W/B)

TM = Transaction Manager

This chart represents various alternatives for distributing the functions (processes) of an application over multiple processors. Transaction management logic, which could be located in any of the processors, would supervise the distribution of work (transactions) according to the scheme (Distributed transaction / Workload balancing) desired. Distributed transaction processing takes place when functions are distributed. Workload balancing is when the same functions may be handled in multiple processors and processor availability is the key factor in distribution of work.

ENCLOSURE 12